May 2025

Environmental Impact Assessment Report - Volume III

Appendices – Part 2

Proposed Extension to the Agall Quarry, Co. Offaly

Condron Concrete Limited

Arden Road, Tullamore, Co. Offaly

MALONE O'REGAN ENVIRONMENTAL

Environmental Impact Assessment Report - Volume III

Proposed Extension to the Agall Quarry, Co. Offaly

Condron Concrete Limited

Arden Road, Tullamore, Co. Offaly

APPENDICES

Appendix 7-1: Borehole Logs

Appendix 7-2: Geotech

Appendix 8-1: Groundwater Sample Results

Appendix 8-2: Historic Groundwater Level Measurements

Appendix 8-3: Past Flood Event Local Area Summary Report for the Site

Appendix 8-4: Water Framework Directive Assessment

Appendix 9-1: Glossary of Acoustic Terms

Appendix 9-2: Modelling Inputs and Outputs

Appendix 10-1: IAQM Guidance on the Assessment of Mineral Impacts for Planning for Dust Risk Assessment.

Appendix 11-1: Qualitative and Quantitative description of levels of impact on Climate Change.

APPENDIX 7-1

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391 | **Client:** Condron Concrete Limited

Project Title: Groundwater Monitoring Programme | **Site Location:** Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW1A

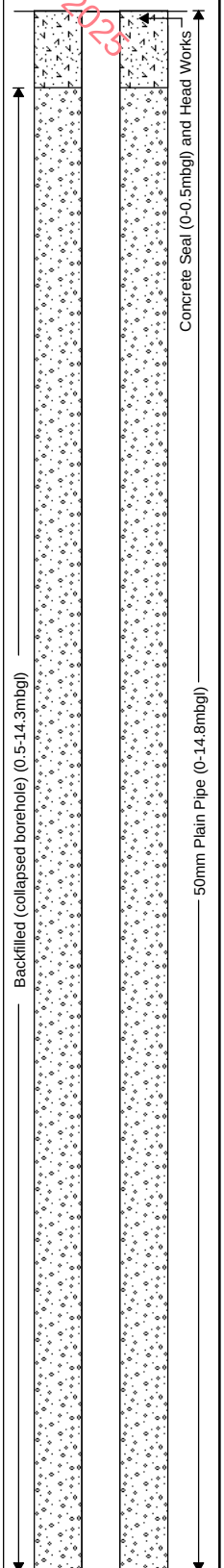
SUBSURFACE CONDITIONS

Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)
0		SAND 2.0-0.5mbgl Brown, slightly clay, fine SAND. Dry.	0-24mbgl: 200mm diameter casing.	
		SAND and GRAVEL 0.5-3.0mbgl Light and dark grey, SAND and GRAVEL. Dry.		
3		SAND 3.0-4.9mbgl Dark grey, gravelly SAND. Dry.		
5		SAND 4.9-6.1mbgl Brown, light and dark grey, SAND. Dry.		
6		SAND 6.1-6.3mbgl Brown, light and dark grey, gravelly SAND. Dry.		
		SAND and GRAVEL 6.3-7.5mbgl Light and dark grey, SAND and GRAVEL. Dry.		
7		SAND 7.5-15.5mbgl Brown, fine SAND. Dry.	7.5-15.5mbgl: Driller Reports 'Sand'. Foam added; required to advance borehole.	
10				

SAMPLE

Depth (mbgl)	PID (ppm)

INSTALLATION DETAILS



Drill Date: 23/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 66.06
Easting: 626622.17
Northing: 722733.24

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 3

BOREHOLE LOG

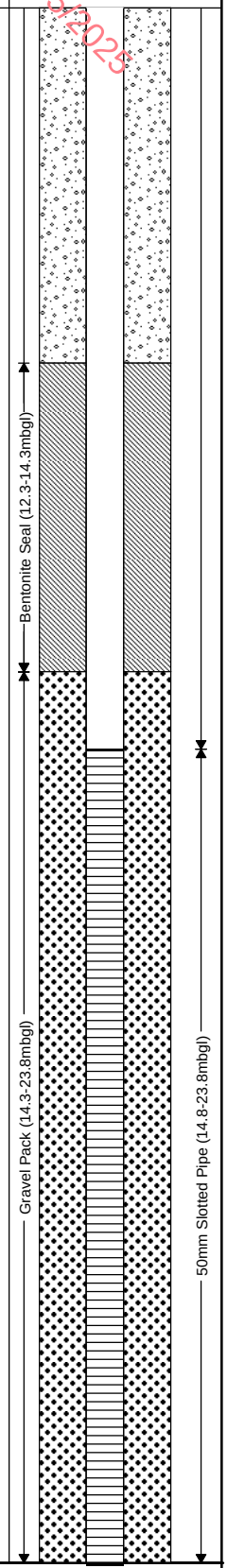
MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391 | **Client:** Condron Concrete Limited

Project Title: Groundwater Monitoring Programme | **Site Location:** Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW1A

SUBSURFACE CONDITIONS				SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
15.5		SAND 15.5-17.5mbgl Brown, grey, white, fine SAND. Dry.		Water Level - 17.85mbgl (23/08/2017)			
17.5		SAND 17.5-22.7mbgl Brown, silty SAND. Damp.					



Drill Date: 23/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 66.06
Easting: 626622.17
Northing: 722733.24

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 2 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

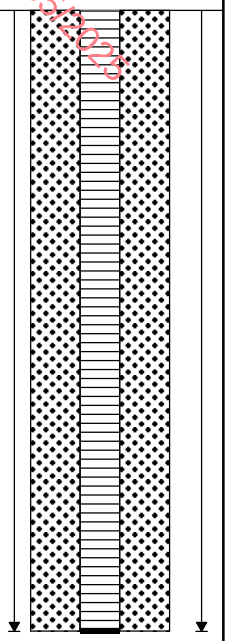
Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW1A

SUBSURFACE CONDITIONS				SAMPLE		
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	INSTALLATION DETAILS
21							
22							
23		CLAY 22.7-23.8mbgl Brown, silty CLAY. Damp.					
24			23.8mbgl - EOH depth.				
25							
26							
27							
28							
29							
30							



Drill Date: 23/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 66.06
Easting: 626622.17
Northing: 722733.24

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 3 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

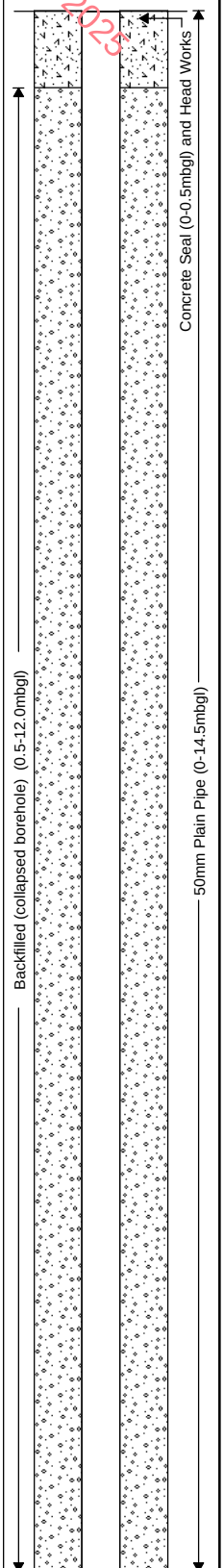
Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW2A

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0		SAND 0.0-0.6mbgl Brown, slightly clay, fine SAND. Dry.	0-23.5mbgl: 200mm diameter casing				
1		SAND and GRAVEL 0.6-5.5mbgl Light and dark grey, SAND and GRAVEL. Dry.					
2							
3							
4							
5							
6		SAND 5.5-12.8mbgl Brown fine SAND. Dry.					
7							
8							
9							
10							



Drill Date: 23/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 67.067
Easting: 626632.045
Northing: 722983.348

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW2A

SUBSURFACE CONDITIONS				SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
11							
12							
13		SAND 12.8-13.3mbgl Brown, slightly clay, fine SAND. Dry.					
14		SAND 13.3-20.0mbgl Brown, fine SAND. At 19.5mbgl: Moist					
15							
16							
17							
18							
19							
20							

Bentonite Seal (12.0-14.0mbgl)

Gravel Pack (14.0-23.5mbgl)

50mm Slotted Pipe (14.5-23.5mbgl)

Drill Date: 23/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 67.067
Easting: 626632.045
Northing: 722983.348

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 2 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391 | **Client:** Condron Concrete Limited

Project Title: Groundwater Monitoring Programme | **Site Location:** Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW2A

SUBSURFACE CONDITIONS					SAMPLE		
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	INSTALLATION DETAILS
21		No returns. 20.0-23.5mbgl	20-23.5mbgl: Foam added; required to advance borehole.	Water Level - 20.04mbgl (23/08/2017)			
22							
23							
			23.5mbgl - EOH depth 24.0mbgl: Bedrock encountered.				
24							
25							
26							
27							
28							
29							
30							

Drill Date: 23/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 67.067
Easting: 626632.045
Northing: 722983.348

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 3 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

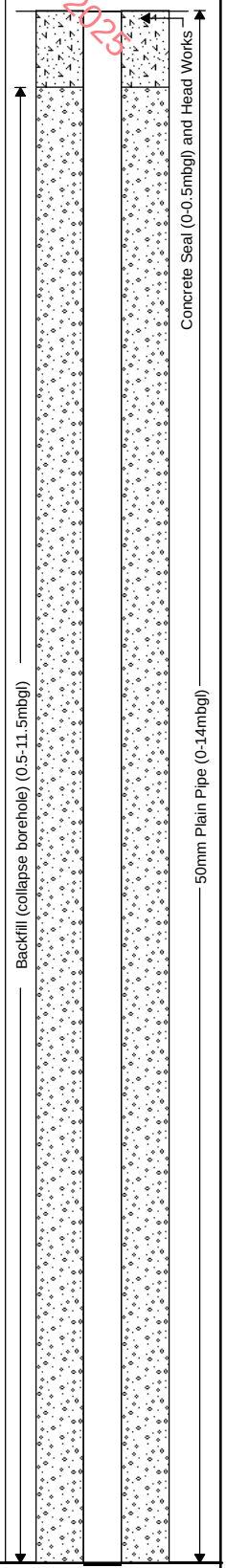
Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3A

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0		SAND 0.0-0.7mbgl Brown, slightly clay, fine SAND. Dry.	0-24mbgl: 200mm diameter casing				
1		SAND and GRAVEL 0.7-4.9mbgl Light and dark grey, SAND and GRAVEL. Dry.					
2							
3							
4							
5		SAND 4.9-5.6mbgl Brown, light and dark grey, gravelly SAND. Dry.					
6		GRAVEL 5.6-6.0mbgl Brown, light and dark grey, slightly sandy GRAVEL. Dry.					
		SAND 6.0-7.5mbgl Brown, fine SAND. Dry.					
7							
8		SAND and GRAVEL 7.5-12.5mbgl Light and dark blue-grey, SAND and GRAVEL. Dry.					
9							
10							



Drill Date: 21-22/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 67.926
Easting: 626787.954
Northing: 723087.820

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3A

SUBSURFACE CONDITIONS				SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
11							Bentonite Seal (11.5-13.5mbgl)
12							
13		SAND and GRAVEL. 12.5-16.6mbgl	12.5-16.5mbgl: Foam added; required to advance borehole.				
14							
15							
16							
17		SAND 16.6-20.0mbgl Brown-grey, fine SAND. Damp.					Gravel Pack (13.5-24mbgl)
18							
19							
20							50mm Slotted Pipe (14-24mbgl)

Drill Date: 21-22/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 67.926
Easting: 626787.954
Northing: 723087.820

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 2 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

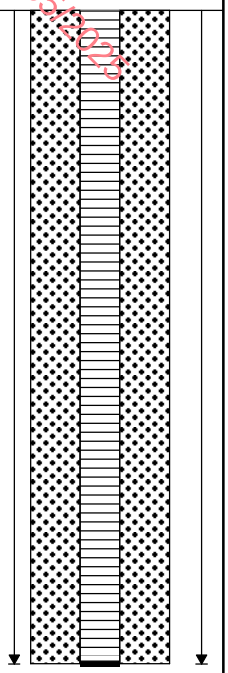
Project Number: E1391 | **Client:** Condron Concrete Limited

Project Title: Groundwater Monitoring Programme | **Site Location:** Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3A

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
21		SAND 20.0-21.5mbgl Brown, slightly clay, fine SAND. Damp.					
22		SAND 21.5-22.0mbgl Brown silty SAND. Damp.					
		CLAY 22.0-22.08mbgl Brown slightly silty CLAY. Damp.					
23		CLAY 22.0-23.0mbgl Brown-grey, gravelly CLAY. Moist.					
		CLAY 23.0-24.0mbgl Brown, sandy CLAY. Moist.					
24			24.0mbgl - EOH depth				
25							
26							
27							
28							
29							
30							

Water Level - 23.1mbgl (23/08/2017)



Drill Date: 21-22/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top of pvc casing
Elevation: 67.926
Easting: 626787.954
Northing: 723087.820

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 3 of 3

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

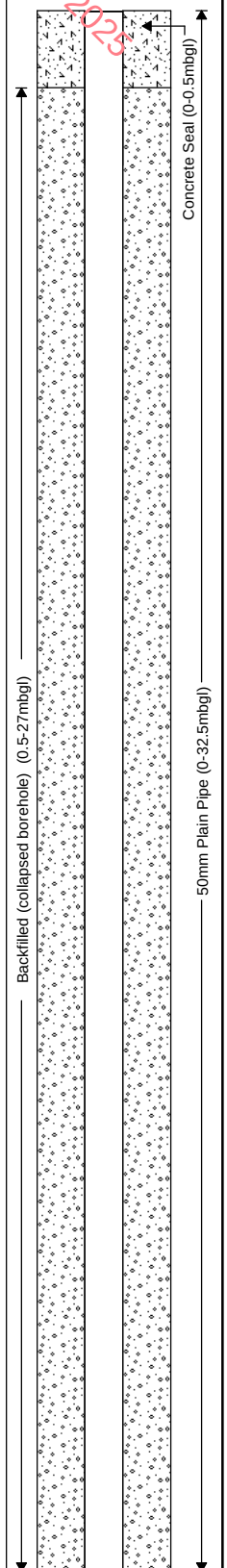
Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3B

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0		SAND 0.0-0.6mbgl Brown, slightly clay, fine SAND. Dry.	0-29.3mbgl: 200mm diameter casing. 29.3-48.5mbgl: open hole drilling.				
1		SAND and GRAVEL 0.6-6.4mbgl Light and dark blue-grey, SAND and GRAVEL. Dry.					
2							
3							
4							
5							
6							
7		SAND 6.4-7.1mbgl Pale blue-grey, gravelly SAND. Dry.					
8		SAND 7.1-8.5mbgl Brown, grey, blue, fine SAND. Dry.					
9		SAND and GRAVEL 8.5-12.0mbgl Pale blue-grey, SAND and GRAVEL. Dry.					
10							



Drill Date: 18-21/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top pf pvc casing
Elevation: 67.917
Easting: 626791.598
Northing: 723087.867

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 5

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3B

SUBSURFACE CONDITIONS				SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
11							Backfilled (collapsed borehole) (0.5-27mbgl)
12		No returns. 12.0-16.0mbgl	12.0-16.0mbgl: Driller Reports 'Boulders'. Foam added; required to advance borehole.				
13							
14							
15							
16		SAND 16.0-21.7mbgl Brown-grey, fine SAND. Damp.					
17							
18							
19							
20							50mm Plain Pipe (0-32.5mbgl)

Drill Date: 18-21/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top pf pvc casing
Elevation: 67.917
Easting: 626791.598
Northing: 723087.867

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 2 of 5

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391 | **Client:** Condron Concrete Limited

Project Title: Groundwater Monitoring Programme | **Site Location:** Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3B

Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	SAMPLE Depth (mbgl)	SAMPLE PID (ppm)	INSTALLATION DETAILS
21							
22		SAND 21.7-22.2mbgl Brown-grey, silty SAND. Damp					
		CLAY 22.2-23.1mbgl Brown, slightly gravelly CLAY. Damp.					
23		CLAY 23.1-23.3mbgl Brown, CLAY. Damp.					
		CLAY 23.3-23.9mbgl Brown-grey, slightly gravelly CLAY. Damp.					
24		CLAY 23.9-24.7mbgl Brown, silty CLAY. Moist.		Water Level 24.36mbgl (23/08/2017)			
		CLAY 24.7-25.9mbgl Brown, gravelly CLAY. Dry.					
25							
26		GRAVEL 25.9-27.0mbgl Light grey-blue, clayey GRAVEL. Dry.					
27		CLAY 27.0-28.9mbgl Brown, gravelly CLAY. Dry.					Bentonite Seal (27-32mbgl)
28							
29		GRAVEL 28.9-29.3mbgl Ligh and dark grey, clayey GRAVEL. Dry.					
		BEDROCK 29.3-48.5mbgl Dark blue-grey, subangular, competent, LIMESTONE.					
30							

Drill Date: 18-21/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top pf pvc casing
Elevation: 67.917
Easting: 626791.598
Northing: 723087.867

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 3 of 5

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

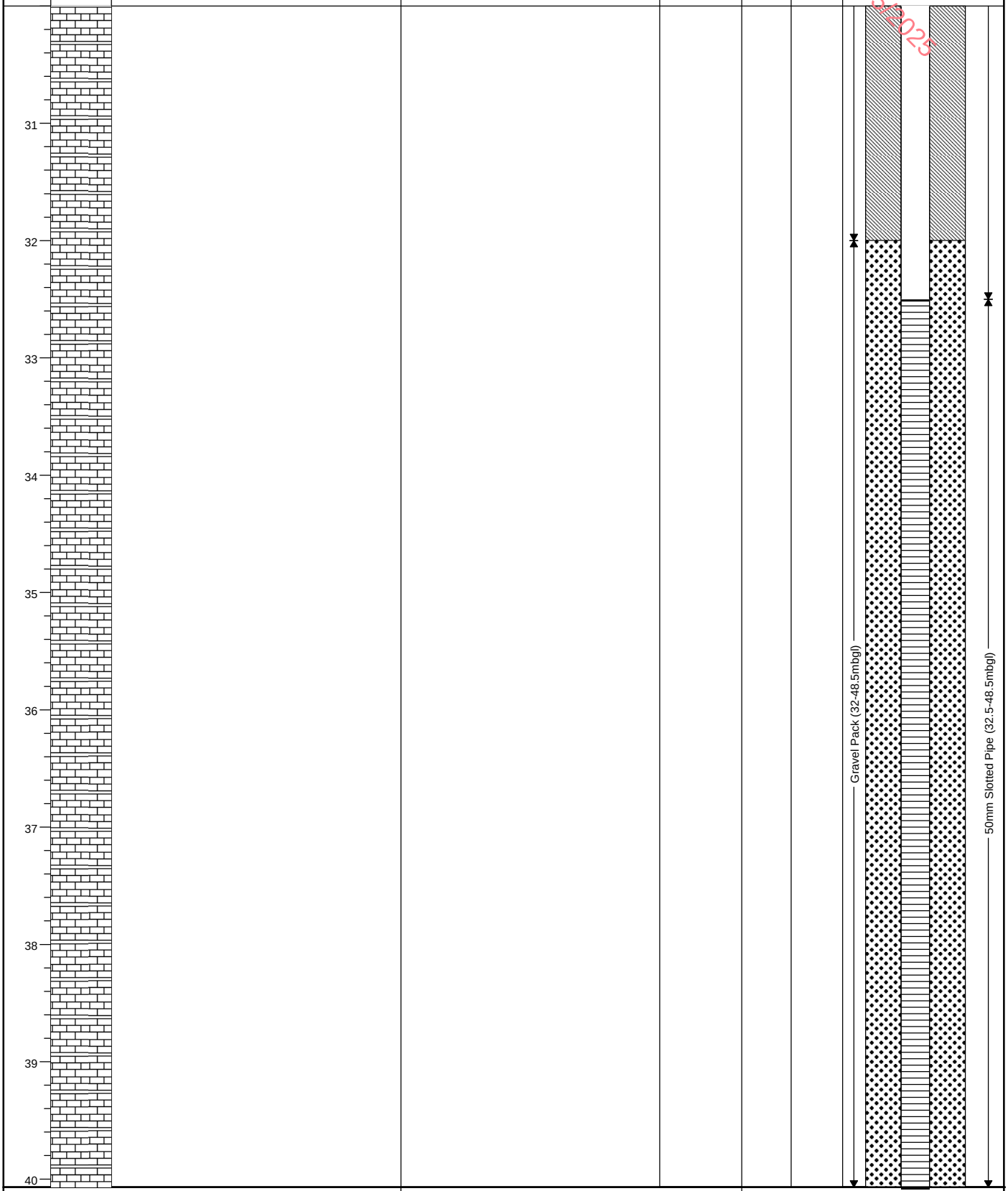
Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3B

SUBSURFACE CONDITIONS				SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	



Drill Date: 18-21/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top pf pvc casing
Elevation: 67.917
Easting: 626791.598
Northing: 723087.867

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 4 of 5

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL SERVICES Ltd.
2B Richview Office Park,
Clonskeagh,
Dublin 14

Project Number: E1391

Client: Condron Concrete Limited

Project Title: Groundwater Monitoring Programme

Site Location: Agall, Tullamore, Co. Offaly

BOREHOLE NO: MW3B

SUBSURFACE CONDITIONS				SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
41							Gravel Pack (32-48.5mbgl)
42							
43							
44				Water Strike 44.5mbgl (21/08/2017)			
45							
46							
47							
48			48.5mbgl - EOH depth				50mm Slotted Pipe (32.5-48.5mbgl)
49							
50							

Drill Date: 18-21/08/2017
Drill Method: Air Rotary (200mm diameter)
Drilled By: Fay Drilling

Logged By: NM
Checked By: CC

Reference Datum: Top pf pvc casing
Elevation: 67.917
Easting: 626791.598
Northing: 723087.867

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 5 of 5

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y

Project Number: E2018 - Agall Quarry
Client: Condron Concrete Limited
Project Title: Agall Quarry Planning Application
Site Location: Agall, Tullamore, Co. Offaly
BOREHOLE NO: MW4

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0		Sandy CLAY with roots 0.0-0.3mbgl SAND and GRAVEL 0.3-0.7mbgl Fine to coarse SAND, fine grey/ black GRAVEL SAND 0.7-1.2mbgl Slightly gravelly, fine to coarse SAND	0-24.0mbgl 158mm diameter casing 24.0-26.5mbgl: open hole drilling and backfilled				Gravel Pack (0.5-1.0mbgl) Concrete (0.0-0.5mbgl)
1		SAND and GRAVEL 1.2-3.0mbgl Fine to coarse SAND, fine to medium subrounded GRAVEL					Bentonite (1.0-2.0mbgl)
2							
3							
4							
5		SAND 3.0-8.0mbgl Fine to medium SAND					Gravel Pack (2.0-10.0mbgl)
6							
7							
8		SAND 8.0-10.0mbgl Gravelly SAND					
9							
10		SAND 10.0-12.0mbgl Fine SAND					Bentonite (10.0-11.0mbgl)
11							Blank Casing (0.0-12.0mbgl)
12		GRAVEL 12.0-12.5mbgl Sandy GRAVEL					
13		SAND 12.5-15.0mbgl Fine SAND					

Drill Date: 25/05/2023
Drill Method: Air Roatry Drilling
Drilled By: Leo Dempsey Water Well Drilling

Logged By: EG
Checked By: LM

Reference Datum: Top of pvc casing
Elevation: 80.790
Easting: 226605
Northing: 222525

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y

Project Number: E2018 - Agall Quarry
Client: Condron Concrete Limited
Project Title: Agall Quarry Planning Application
Site Location: Agall, Tullamore, Co. Offaly
BOREHOLE NO: MW4

Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	SAMPLE Depth (mbgl)	SAMPLE PID (ppm)	INSTALLATION DETAILS
14							
15							
16		GRAVEL 15.0-18.0mbgl GRAVEL with sand lenses interbedded					
17							
18		SAND 18.0-19.0mbgl Fine SAND					
19		SAND 19-200mbgl Fine to medium SAND					
20		SAND 20.0-23.0mbgl Silty SAND					
21							
22							
23		SAND 23.0-24.00mbgl Very clayey SAND					
24		Weathered BEDROCK 24.0-26.5mbgl					
25							
26			26.5mbgl - EOH depth				
27							

Gravel Pack (12.0-24.0mbgl)
Slotted Casing (12.0-24.0mbgl)

Drill Date: 25/05/2023
Drill Method: Air Roatry Drilling
Drilled By: Leo Dempsey Water Well Drilling

Logged By: EG
Checked By: LM

Reference Datum: Top of pvc casing
Elevation: 80.790
Easting: 226605
Northing: 222525

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y

Project Number: E2018 - Agall Quarry
Client: Condron Concrete Limited
Project Title: Agall Quarry Planning Application
Site Location: Agall, Tullamore, Co. Offaly
BOREHOLE NO: MW5

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0		Brown clay with roots TOPSOIL 0.0-0.2mbgl Dry	0-7.4mbgl 158mm diameter casing 7.4-14.5mbgl: open hole drilling 14.5-18.0mbgl: open hole drilling and				Concrete (0.0-0.5mbgl) Gravel Pack (0.5-1.0mbgl) Bentonite (1.0-2.0mbgl) Gravel Pack (2.0-6.5mbgl) Bentonite (6.5-7.5mbgl) Blank Casing (0.0-8.5mbgl)
1							
2							
3							
4							
5		SAND 0.20-12.5mbgl Fine SAND Dry					
6							
7							
8							
9							
10							
11							
12							
13		SAND 0.7-1.2mbgl Slightly gravelly, fine subangular grey gravel, fine to coarse SAND Dry					

Drill Date: 26/05/2023
Drill Method: Air Roatry Drilling
Drilled By: Leo Dempsey Water Well Drilling

Logged By: EG
Checked By: LM

Reference Datum: Top of pvc cassing
Elevation: 71.780
Easting: 226480
Northing: 223001

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y

Project Number: E2018 - Agall Quarry
Client: Condron Concrete Limited
Project Title: Agall Quarry Planning Application
Site Location: Agall, Tullamore, Co. Offaly
BOREHOLE NO: MW5

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
14							Gravel Pack (7.5-14.5mbgl)
15							Slotted Casing (8.5-14.5mbgl)
16		Weathered BEDROCK 15.5-18.0mbgl					
17			18.0mbgl - EOH depth				
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							

Drill Date: 26/05/2023
Drill Method: Air Roatry Drilling
Drilled By: Leo Dempsey Water Well Drilling

Logged By: EG
Checked By: LM

Reference Datum: Top of pvc cassing
Elevation: 71.780
Easting: 226480
Northing: 223001

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

APPENDIX 7-2

AGP22087_01

Report on the Geophysical Investigation at Agall, Tullamore, Co. Offaly for Malone O'Regan Environmental .

2ND August 2022

APEX Geophysics Limited
Unit 6, Knockmullen Business Park
Gorey
Co. Wexford

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E: info@apexgeophysics.ie
W: www.apexgeophysics.com

PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOPHYSICS LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

PROJECT NUMBER	AGP22087		
AUTHOR	**CHECKED**	**REPORT STATUS**	**DATE**
PETER O'CONNOR M. SC. (GEOPHYSICS)	EURGEOL YVONNE O'CONNELL P.GEO., PH.D. (GEOPHYSICS)	V.01	2ND AUGUST 2022

CONTENTS

1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Malone O'Regan Environmental to carry out a geophysical investigation at Agall, Co. Offaly. The site is adjacent to a working sand and gravel quarry and has potential for sand and gravel deposits. The objective of the investigation was to provide information on overburden thickness, on sand and gravel thickness and quality, to estimate the volume of potential resource and to estimate the depth to and type of bedrock.

The site is located at Agall approximately 7.5 km southwest of Tullamore, Co. Offaly. The site covers an area of approximately 16 ha and comprises of open agricultural fields. Site topography is smooth and ranges from 68.7 to 84 m OD. Exposed face height in the adjacent pit is c. 15 – 20 m. Overburden appears thin (c. 1 m) and underlain by 1-2 m of boulder and cobble rich sand/gravel. The main body of the pit appears to consist of sand, thin beds of fine sand/silt and occasional gravel layers.

The Geological Survey of Ireland (GSI) 1:100k Bedrock Geology Map shows undifferentiated Visean Limestone in the south and southeast and thick-bedded limestone with locally peloidal of the Allenwood Formation in the north/northwest. The GSI Quaternary Sediments map for the area shows gravels derived from limestone. The bedrock is classified as a 'Regionally important aquifer – Karstified (diffuse)' and the sand/gravel deposits as a 'Locally important gravel aquifer'. The historical 6-inch sheet noted adjacent 'fine stratified sand'.

The survey was carried out on the 5th and 6th of July 2022 consisting of EM conductivity readings, ERT profiles and seismic refraction profiles and has outlined two zones. **Zone A** is a c. 12.1 ha area of **'clean' SAND/GRAVEL** underlain by **silty SAND/GRAVEL**. The interpreted thickness of the **'clean' SAND/GRAVEL** ranges from 7 – 20 m and the underlying **silty SAND/GRAVEL** ranges from 5 to 9 m. Estimated volume of the 'clean' SAND/GRAVEL in Zone A is **c.2.5 m.t.** and of the deeper silty SAND/GRAVEL**. c. 1.2 m.t.**

Zone B is a smaller zone (c. 3.9 ha) of thinner **silty and clayey SAND/GRAVEL** in the north of the site with an average thickness of 7 m with an estimated volume of c. 0.3 m.t.. Sand/gravel thickness and quality generally decreases to the north.

Topsoil/soil/silty SAND/GRAVEL thickness is estimated at approx. 1 m apart from occasional local pockets of thicker material. The seismic data indicate that the upper 1-4 m of the soil and sand/gravel is more compact or dense than the underlying material which may be due to the cobble/boulder layer visible in face. The seismic velocity of the deeper silty SAND/GRAVEL also indicates an increase in compaction/density or saturation by groundwater.

Bedrock has been indicated by the seismic data at a depth of approx. 25 m bgl (55 mOD). The electrical resistivity and seismic velocity are typical of a slightly weathered to fresh dark medium to thickly bedded clean LIMESTONE apart from the northern end of the site where a transition to darker limestone or mudstone is indicated.

Further investigation is warranted and confirmatory direct investigation by pitting and drilling is recommended. Locations of boreholes and trial pits are given. Samples should be taken for Particle Size Distribution (PSD) analysis and for chemical, physical, mechanical and laboratory tests to assess suitability for use.

The geophysical report should be reviewed after any direct investigation.

2. INTRODUCTION

APEX Geophysics Limited was requested by Malone O'Regan Environmental to carry out a geophysical investigation at Agall, Co. Offaly. The site is adjacent to a sand and gravel quarry and has potential for sand and gravel deposits.

2.1 Survey Objectives

The objective of the investigation was to provide information on the following:

- overburden thickness
- sand and gravel thickness and quality
- estimate volume of potential resource
- depth to and type of bedrock

2.2 Site Background

The site is located at Agall, Co. Offaly, approximately 7.5 km southwest of Tullamore, Co. Offaly (Fig. 2.1). The site covers an area of approximately 16 ha and comprises of open agricultural fields. Site topography is smooth and ranges from 68.7 to 84 m OD, with the ground slightly sloping towards the north of the survey area.

Fig 2.1: Site location.

There is a working pit immediately east of the survey area with an exposed face height of c. 15 – 20 m. Overburden appears thin (c. 1 m) and is underlain by 1-2 m of boulder and cobble rich sand/gravel (Fig. 2.2). The main body of the pit appears to consist of sand, thin beds of fine sand/silt and occasional gravel layers. The

working pit has not been visited by the author and the above description is based on site photographs taken during the geophysical survey. No standing water is visible on the floor of the pit.

Fig 2.2: View of western working face.

2.2.1 Geology

The Geological Survey of Ireland (GSI) 1:100k Bedrock Geology map for the area (GSI 2019a) indicates that the site is predominantly underlain by undifferentiated Visean Limestone in the south and southeast and thick-bedded limestone, locally peloidal of the Allenwood Formation in the north and northwest (Figure 2.3).

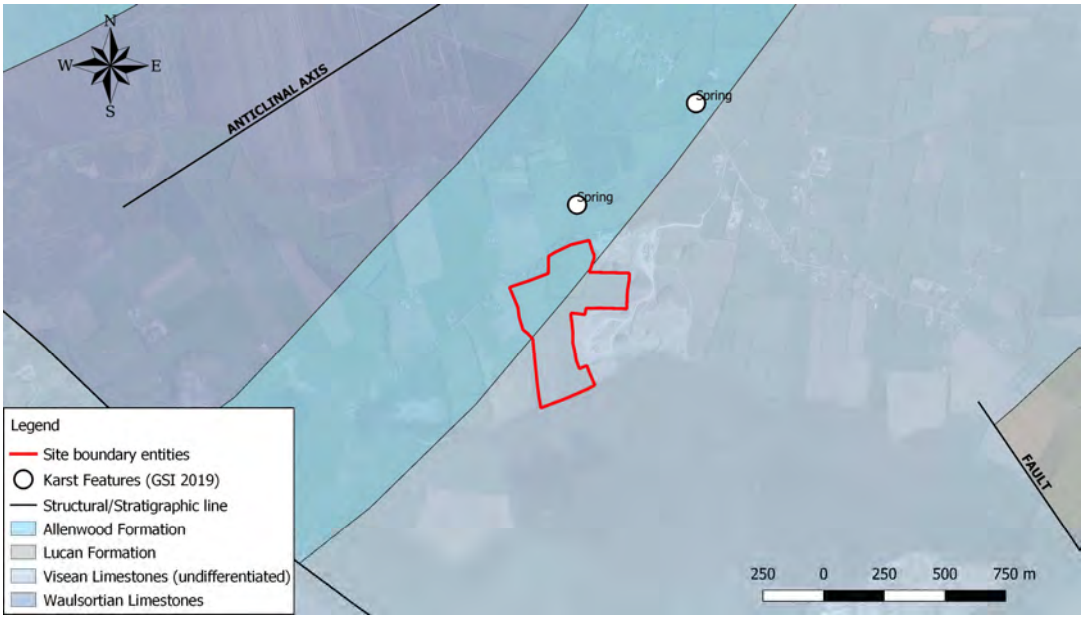

Fig 2.3: Bedrock geology.

2.2.2 Soils

The GSI Quaternary Sediments map for the area (GSI 2019b) indicates that the site is in an area of gravels derived from limestone (Fig. 2.4).

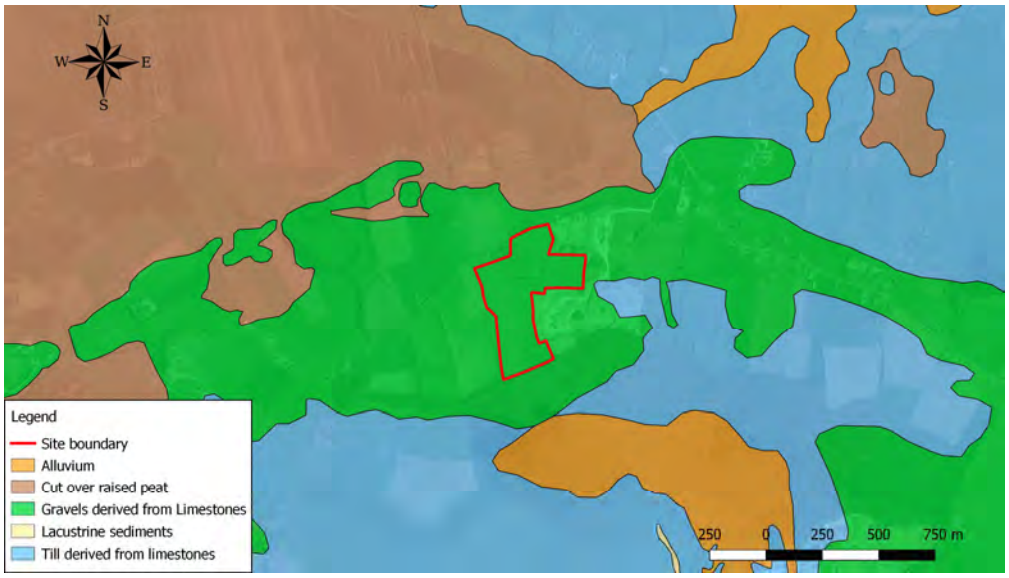

Fig 2.4: Quaternary sediments.

2.2.3 Vulnerability

The groundwater vulnerability rating for the survey area (GSI 2019c) is 'high' (Fig. 2.5).

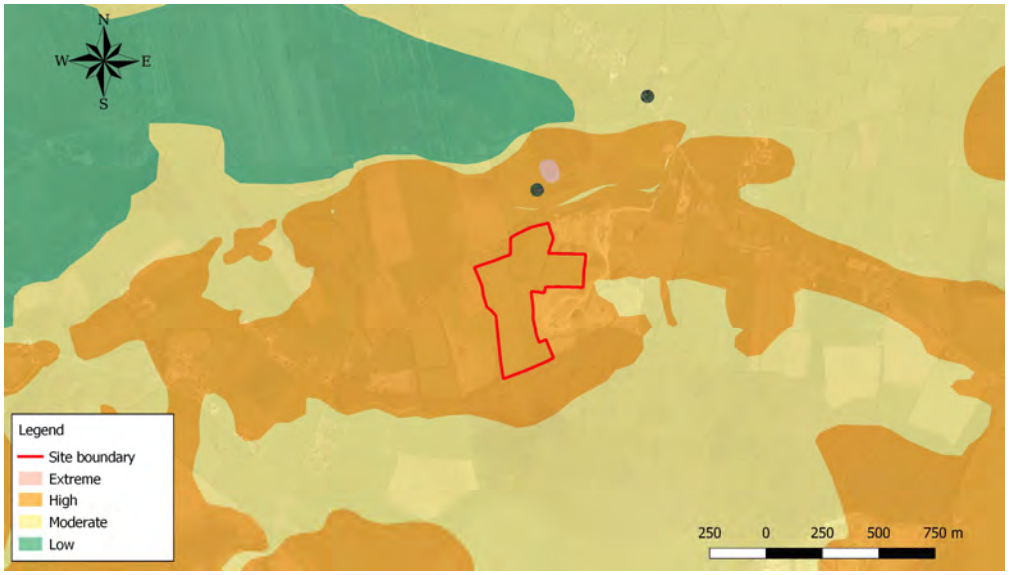

Fig 2.5: Groundwater vulnerability.

2.2.4 Aquifer Classification

The bedrock under the site is classified as a 'Regionally important aquifer – Karstified (diffuse)' (Fig. 2.6A). The sand/gravel deposits are classified as a 'Locally important gravel aquifer' (Fig. 2.6B).

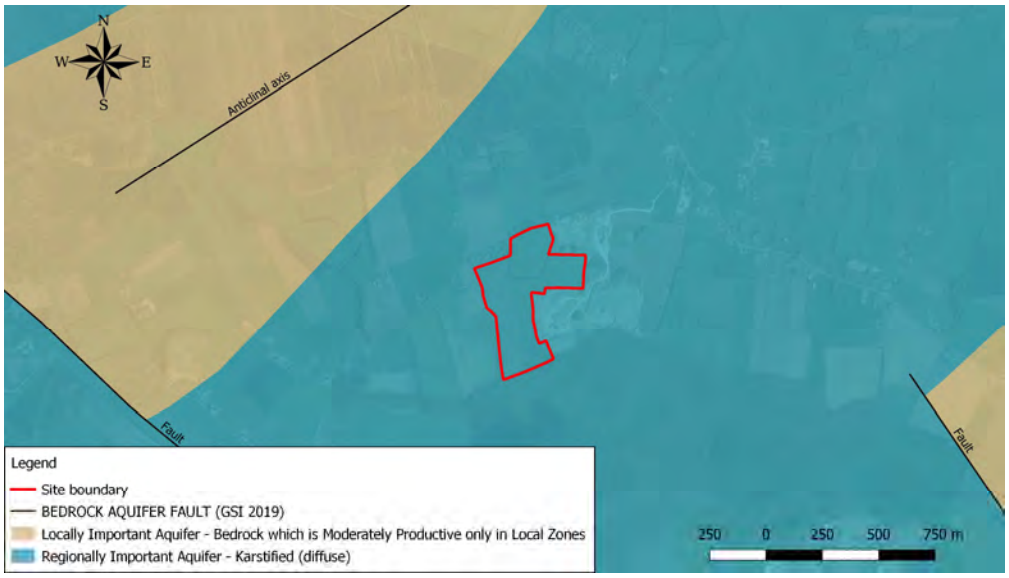

Fig 2.6A: Bedrock aquifer.

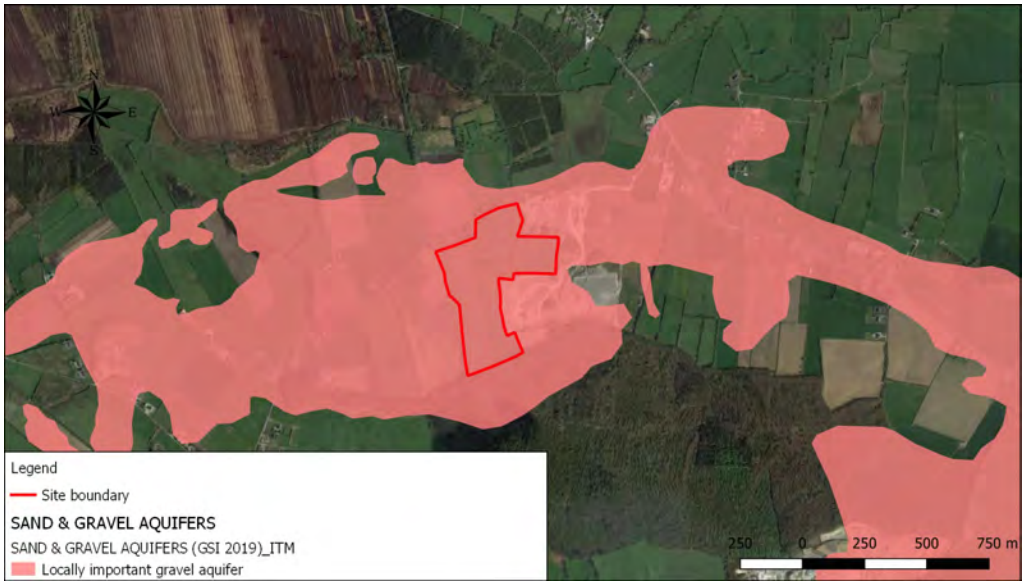

Fig 2.6B: Gravel aquifer.

2.2.5 Historical Data

The historical 6-inch sheet (Fig. 2.7) shows the site is to the north of steep drift bank with 'fine stratified sand' mentioned at a two adjacent locations. Boglands are mapped to the north and the ground is sloping towards the north of the survey area.

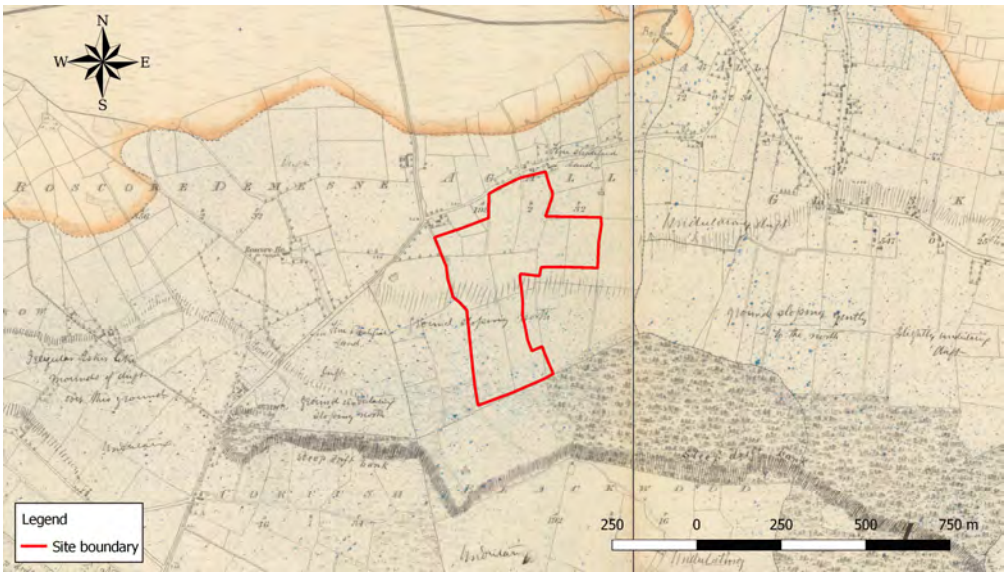

Fig 2.7: The historical 6-inch map.

2.3 Survey Rationale

The investigation consisted of reconnaissance EM ground conductivity mapping with follow-up 2D ERT and Seismic Refraction profiling:

EM ground conductivity mapping operates on the principle of inducing currents in conductive substrata and measuring the resultant secondary electro-magnetic field. The strength of this secondary EM field is calibrated to give apparent ground conductivity in milliSiemens/metre (mS/m). This technique will provide information on the shallow (0-6m below ground level) variation of the superficial deposits and outline shallow bedrock.

ERT images the electrical resistivity of the materials in the subsurface along a profile to produce a cross-section showing the variation in resistivity with depth. Each cross-section will be interpreted to determine the material type along the profile based on typical resistivities returned for Irish ground materials.

Seismic Refraction profiling measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

As with all geophysical methods the results are based on indirect readings of the subsurface properties. The effectiveness of the proposed approach will be affected by variations in the ground properties. By combining a number of techniques it is possible to provide a higher quality interpretation and reduce any ambiguities which may otherwise exist. Further information on the detailed methodology of each geophysical method employed in this investigation is given in **APPENDIX A: DETAILED GEOPHYSICAL METHODOLOGY**.

3. RESULTS

The survey was carried out on the 5th and 6th of July 2022 involving the collection of EM conductivity readings, 4 ERT profiles and 4 seismic refraction profiles. The geophysical survey locations are indicated on Drawing AGP22087_01 (Appendix B).

3.1 EM Ground Conductivity Mapping

The EM ground conductivity results (Drawing AGP22087_02, Appendix B) show the bulk conductivity of the ground materials from 0 - 6.0 m bgl. The recorded conductivity values ranged from 0.2 to 4.8 mS/m and have been generally interpreted in conjunction with the ERT and seismic data as follows:

Conductivity (mS/m)	Interpretation
0.2 – 2.5	Topsoil/soil over SAND/GRAVEL and silty SAND/GRAVEL
2.5 – 4.8	Topsoil/soil over silty and clayey SAND/GRAVEL

3.2 ERT

Four ERT Profiles (R1-R4) have been acquired across the site. The resistivity values have been interpreted on the following basis.

Resistivity (Ohm-m)	Interpretation
600-1000 (at surface)	Topsoil/soil/silty SAND/GRAVEL
250-500	Clayey SAND/GRAVEL
500-1,000	Silty SAND/GRAVEL
1,000-3,000	'Clean' SAND/GRAVEL
150-1,000	DARK LIMESTONE/MUDSTONE
1,000-3,175	LIMESTONE

3.3 Seismic refraction profiling

Four seismic refraction spreads were recorded across the site (S1 - S4, Appendix C). The seismic velocities have been interpreted on the following basis:

P-Wave Seismic Velocity (m/s)	Interpretation	Estimated Stiffness/ Rock Quality
353-450	Topsoil/soil/silty SAND/GRAVEL	Soft/Loose
600-800	SAND/GRAVEL, silty or clayey SAND/GRAVEL	Medium Dense
1,900-2,000	SAND/GRAVEL, silty or clayey SAND/GRAVEL	Very Dense
4,100-5,500	Slightly Weathered to Fresh LIMESTONE/DARK LIMESTONE / MUDSTONE	Good (apart from any Mudstone)

4. DISCUSSION

The geophysical results are presented on Drawings AGP22087_R1 to AGP22087_R4, Appendix B and summarised on Drawing AGP22087_03.

Electrical resistivity values for Irish sand and gravel deposits are generally within the following ranges:

Material	*Fines Content %	Resistivity (Ohm-m)	Economic Potential
'Clean' SAND/GRAVEL	< 5	> 1000	Yes
Silty SAND/GRAVEL	5 - 15	500-1000	may have, subject to screening/washing.
Clayey SAND/GRAVEL	> 15%	250-500	unlikely, due to fines content

**Fines refer to the clay and silt content of the sand/gravel material. The higher the fines content the poorer the material and use is restricted and screening/or washing required. These estimates should be confirmed by subsequent sampling and testing.*

The geophysical survey has outlined the following two zones across the site (Drawing AGP22087_03):

- Zone A is a zone of **'clean' SAND/GRAVEL** underlain by **silty SAND/GRAVEL** that covers south and middle of the of the site;
- Zone B is a smaller zone of thinner **silty and clayey SAND/GRAVEL** in the north of the site. Sand/gravel thickness and quality generally decreases to the north.

In Zone A the interpreted thickness of the **'clean' SAND/GRAVEL** ranges from 7 – 20 m and the underlying **silty SAND/GRAVEL** ranges from 5 to 9 m.

The upper **'clean' SAND/GRAVEL** has likely economic potential and the deeper **silty SAND/GRAVEL** material may have economic potential but the estimated fines content of between 5% and 15% could be a limiting factor. Direct investigation by drilling is merited and recommended. The seismic velocity of the deeper layer is high (1900 – 2000 m/s) which may be due to an increase in compaction/density of the material or saturation by groundwater.

Topsoil/soil/silty SAND/GRAVEL thickness is estimated at approx. 1 m apart from occasional local pockets of thicker material (e.g. at northern end of R3, Drawing AGP22087_R3). The seismic velocity data indicate that the upper 1-4 m of the soil and sand/gravel is more compact or dense than the underlying material which may be due to the cobble/boulder layer visible in Fig. 2.2.

Bedrock has been indicated by the seismic data at a depth of approx. 25 m bgl (55 mOD). The electrical resistivity of the rock (1,000 – 3,175 Ohm-m) and seismic velocities (4,100-5,500 m/s) are typical of a slightly weathered to fresh dark medium to thickly bedded clean LIMESTONE apart from the northern 100-120 m of the site where a transition to darker limestone or mudstone is indicated by lower resistivity values (see R1 – R3).

4.1 RESOURCE ESTIMATE

The interpreted data have outlined a preliminary resource of **'clean' SAND/GRAVEL** in Zone A with an average interpreted thickness of 14 m underlain by **silty SAND/GRAVEL** with an average interpreted thickness of 7 m. Zone B has an interpreted thickness of 7m of **silty SAND/GRAVEL** across a smaller area and may have thicker overburden and/or lenses of clayey gravel.

The estimated volumes are shown in Table 4.1 below:

Zone	Material	Extent	Average Thickness (0.7 correction applied) **	Computed Sand/Gravel Volume	Sand/Gravel Resource Tonnes ***
		(ha)	(m)	(cu.m)	(@1.8 t/cu.m. - 5% fines)
A	sand/gravel	10.30	14.0	1,442,000	2,465,820
A	silty sand/gravel	10.30	7.0	721,000	1,232,910
B	silty and clayey sand/gravel	2.40	7.0	168,000	287,280
Total					3,986,010

Table 4.1 Preliminary resource estimate.

*** The estimated thicknesses shown on the ERT profiles have been multiplied by a calibration factor of 0.7, (this is due to the overestimation of the thickness of high resistivity materials, which is an artifact of resistivity data processing software.*

**** A conversion density of 1.8 tonnes/cu.m. for SAND/GRAVEL has been used.*

The geophysical results have outlined a combined potential resource of **c.2.5 m.t. of 'clean' SAND/GRAVEL** and **c. 1.2 m.t of deeper silty SAND/GRAVEL.** The main resource is located in Zone A (c. 3.7 m.t in total) with a possible additional c. 0.3 m.t. in Zone B. An allowance of -5% has been made for waste and 30 m for standoffs from boundaries.

The above estimate is based on interpreted geophysical data and average heights from the topographic data acquired as part of the geophysical investigation. Further investigation is warranted and confirmatory direct investigation by pitting and drilling is recommended.

Economic potential is subject to satisfactory laboratory testing, planning and development cost considerations but results to date merit direct investigation by drilling sampling and testing. Given the classification of the gravel body as a local aquifer permission to extract below the watertable is unlikely.

5. RECOMMENDATIONS

Boreholes and trial pits to confirm the findings of the geophysical survey are recommended at the following locations:

No.	Easting (ITM)	Northing (ITM)
PBH1	626564.7	722943.7
PBH2	626606.9	722720.6
TP1	626654.3	723143.6
TP2	626497.7	722987.0
TP3	626617.9	723004.6
TP4	626800.6	723025.7
TP5	626611.1	722872.3
TP6	626558.4	722788.6
TP7	626577.4	722618.6
TP8	626700.3	722649.6

PBH1 and PBH2 should be drilled to a nominal 25 m or until the sand/gravel is bottomed out or regional watertable encountered. Samples should be taken from the trial pits and boreholes for Particle Size Distribution (PSD) analysis and for chemical, physical, mechanical and laboratory tests to assess suitability for use. If the pits show good quality material down to 4 - 5 m then two pits should be deepened as macro pits with the sides battered back to a safe angle to allow digging in of the excavator.

The geophysical report should be reviewed after any direct investigation.

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GSI, 2019c;
Groundwater Vulnerability Shapefile. http://www.gsi.ie/Mapping.htm

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APPENDIX A: DETAILED GEOPHYSICAL METHODOLOGY

A combination of geophysical techniques was used to provide a high-quality interpretation and reduce any ambiguities, which may otherwise exist.

EM Ground Conductivity Mapping

Principles

This is an electromagnetic technique used to investigate lateral variations in overburden material and to assist with the indication of the depth to bedrock. This method operates on the principle of inducing currents in conductive substrata and measuring the resultant secondary electro-magnetic field. The strength of this secondary EM field is calibrated to give apparent ground conductivity in milliSiemens/metre (mS/m). Readings over material such as organic waste and peat give high conductivity values while readings over dry materials with low clay mineral content such as gravels, limestone or quartzite give low readings. The EM31 survey technique determines the apparent conductivity of the different overburden layers from 0-6m bgl depending on the dipole mode used.

Data collection

The EM31 equipment used was a GF CMD-4 conductivity meter equipped with data logger and integrated GPS. This instrument features a real time graphic display of the previous 20 measurement points to monitor data quality and results. Conductivity and in-phase values were recorded across the site. Local conditions and variations were recorded.

Data processing

The conductivity and in-phase field readings were downloaded, contoured and plotted using the SURFER 12 program (Golden Software, 2015). Data which was affected by metallic objects was removed. Assignation of material types and possible anomaly sources was carried out, with cross-reference to other data.

Electrical Resistivity Tomography (ERT)

Electrical Resistivity Tomography was carried out to provide information on lateral variations in the overburden material as well as on the underlying overburden and bedrock.

Principles

This surveying technique makes use of the Wenner resistivity array. The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. This method involves the use of electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

Data Collection

Profiles were recorded using an ABEM LS4 resistivity meter, imaging software, four 21 takeout multicore cables and up to 80 stainless steel electrodes. Saline solution was used at the electrode/ground interface in order to gain a good electrical contact required for the technique to work effectively. The recorded data were processed and viewed immediately after surveying.

Data Processing
The field readings were stored in computer files and inverted using the RES2DINV package (Geotomo Software, 2006) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-depth model of the resistivities.

The inverted 2D resistivity models and corresponding interpreted geology are displayed on the accompanying drawings alongside the processed seismic sections. Profiles have been contoured using the same contour intervals and colour codes. Distance is indicated along the horizontal axis of the profiles.

Seismic Refraction Profiling

Principles
This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

Seismic profiling measures the p-wave velocity (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher Vp velocities while soft, loose or fractured materials have lower Vp velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

Data Collection
A Geode high resolution 24 channel digital seismograph, 24 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable. Equipment was carried and operated by a two-person crew.

Readings are taken using geophones connected via multi-core cable to a seismograph. The depth of resolution of soil/bedrock boundaries is determined by the length of the seismic spread, typically the depth of resolution is about one third the length of the profile. (eg. 69m profile ~23m depth, 33m profile ~ 11m depth).

Data Processing
First break picking in digital format was carried out using the FIRSTPIX software program to construct p-wave (Vp) traveltime plots for each spread. Velocity phases were selected from these plots using the GREMIX software program and were used to calculate the thickness of individual velocity units. Topographic data were input. Material types were assigned and estimation made of material properties. The processed seismic data are displayed in Appendix C.

GREMIX interprets seismic refraction data as a laterally varying layered earth structure. It incorporates the slope-intercept method, parts of the Plus-Minus Method of Hagedoorn (1959), Time-Delay Method, and features the Generalized Reciprocal Method (GRM) of Palmer (1980). Up to four layers can be mapped; one deduced from direct arrivals and three deduced from refractions. Phantoming of all possible travel time pairs can be carried

Approximate errors for Vp velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

Spatial Relocation

All ERT and Seismic Refraction locations were acquired using a Trimble Geo 7X high-accuracy GNSS handheld system using the settings listed below. This system allows collection of GPS data with c.20mm accuracy.

Projection:	Irish Transverse Mercator
Datum:	Ordnance
Coordinate units:	Metres
Altitude units:	Metres
Survey altitude reference:	MSL
Geoid model:	Republic of Ireland

The EM conductivity locations were acquired using a system integrated GPS receiver to an x,y accuracy of +/- 5m or better and converted to ITM.

APPENDIX B: DRAWINGS

The information derived from the geophysical investigation presented in the following drawings:

AGP22087_01 Geophysical Locations	1:4000	@ A4
AGP22087_02 EM Conductivity Results	1:4000	@ A4
AGP22087_03 Summary Interpretation Map	1:4000	@ A4
AGP22087_R1 ERT R1 & Seismic S1 Results & Interpretation	1:2500	@ A4
AGP22087_R2 ERT R2 & Seismic S2 Results & Interpretation	1:2000	@ A4
AGP22087_R3 ERT R3 & Seismic S3 Results & Interpretation	1:2500	@ A4
AGP22087_R4 ERT R4 & Seismic S4 Results & Interpretation	1:1000	@ A4

GEOPHYSICAL LOCATIONS

SCALE 1:4000

INDEX MAP:

LEGEND:

- Site
- EM conductivity reading
- R1 — 2D resistivity profile
- S1 — Seismic refraction profile

The information displayed here is to be used in conjunction with AGP22087_01 Report on the Geophysical Investigation at Agall, Tullamore for Malone O'Regan Env. Ltd., APEX Geophysics Ltd. 2nd August 2022.

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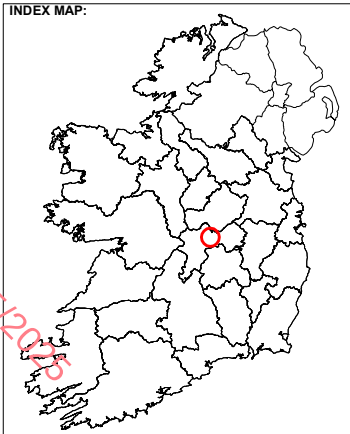
PROJECT:	AGALL TULLAMORE GEOPHYSICAL SURVEY
CLIENT.:	MALONE O'REGAN ENVIRONMENTAL
DRAWING NO:	AGP22087_01
SCALE:	AS INDICATED @ A4
DATE:	02-08-2022

Version:	Date:	Drawn By:	Checked:
001	02-08-2022	POC	YOC

EM CONDUCTIVITY RESULTS

SCALE 1:4000

INDEX MAP:



LEGEND:

- Site
- EM conductivity reading
- 2D resistivity profile (R1)
- Seismic refraction profile (S1)

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CLIENT.:	MALONE O'REGAN ENVIRONMENTAL
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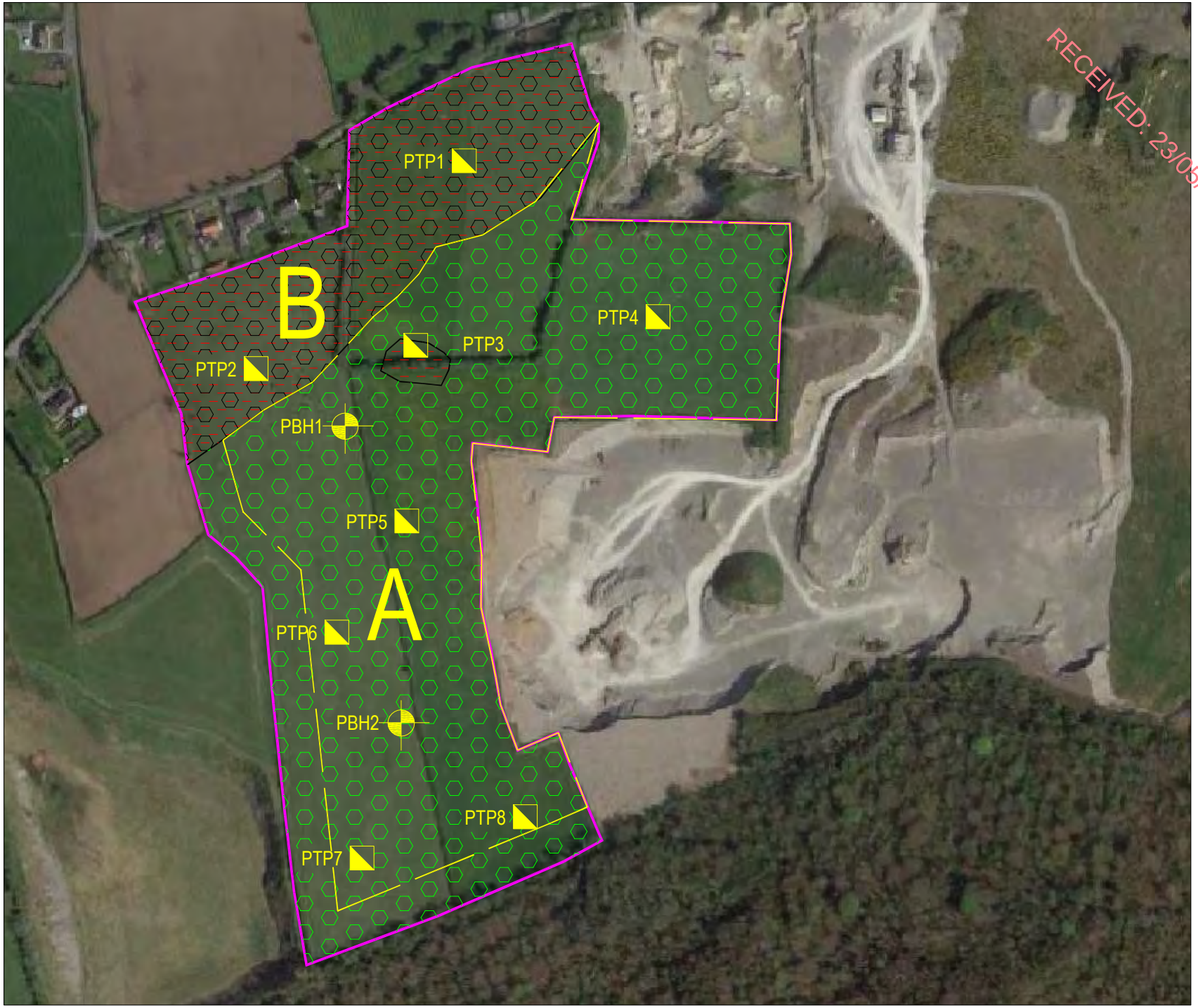
SCALE:	AS INDICATED @ A4
DATE:	02-08-2022

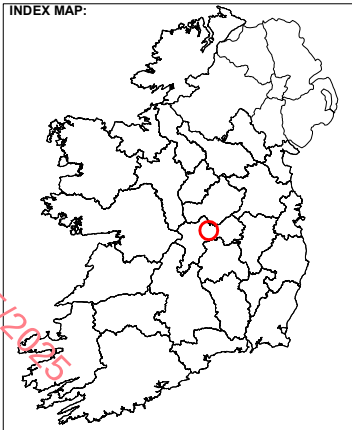
Version:	Date:	Drawn By:	Checked:
001	02-08-2022	POC	YOC

SUMMARY INTERPRETATION MAP

SCALE 1:4000



INDEX MAP:



LEGEND:

- SAND/GRAVEL and silty SAND/GRAVEL
- Silty SAND/GRAVEL and clayey SAND/GRAVEL
- R2 — SAND/GRAVEL Resource Area
- PTP1 — Proposed Trial Pit
- PBH1 — Proposed Borehole

The information displayed here is to be used in conjunction with AGP22087_01 Report on the Geophysical Investigation at Agall, Tullamore for Malone O'Regan Env. Ltd., APEX Geophysics Ltd. 2nd August 2022.

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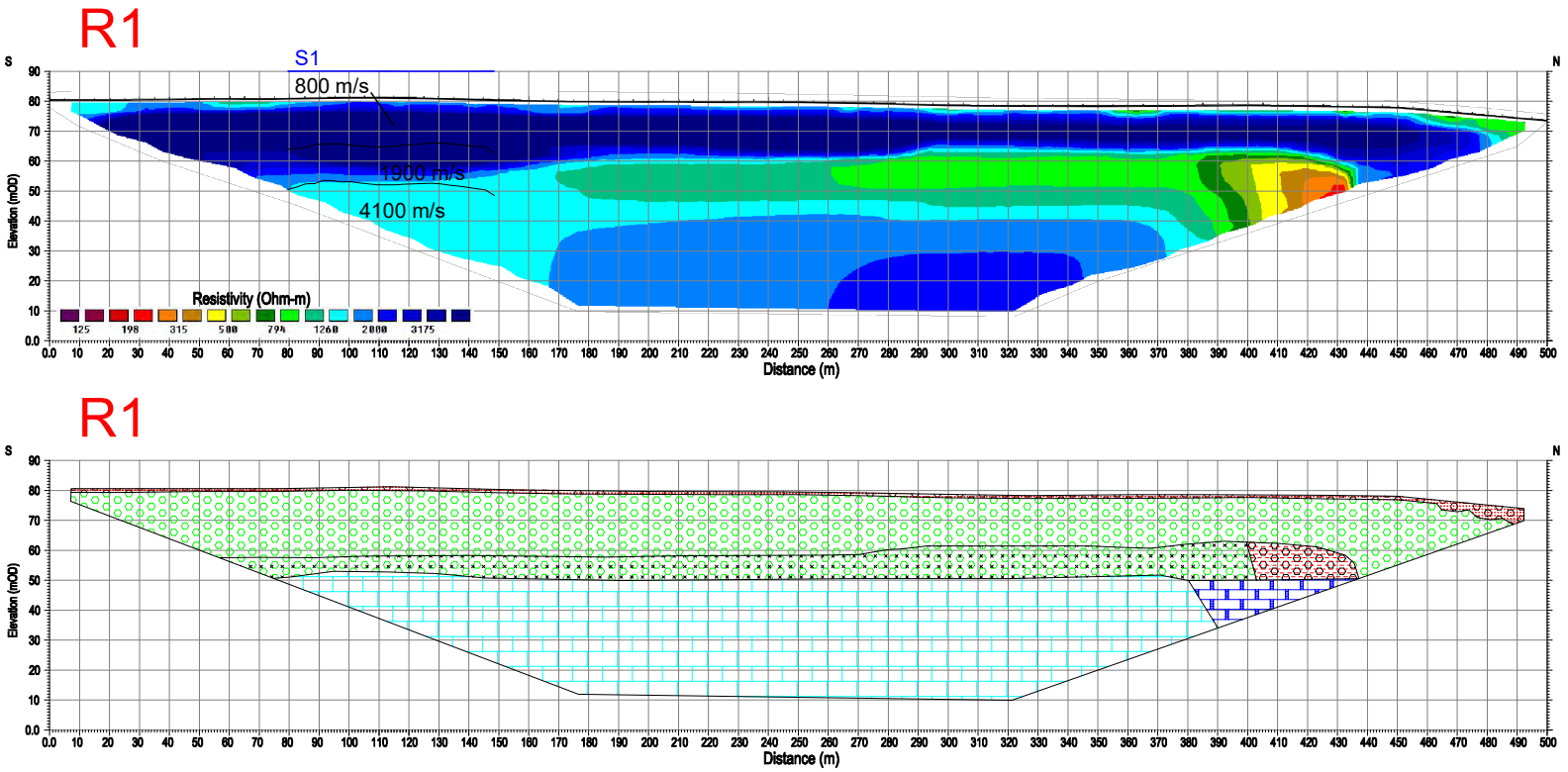
PROJECT:	AGALL TULLAMORE GEOPHYSICAL SURVEY
CLIENT.:	MALONE O'REGAN ENVIRONMENTAL
DRAWING NO:	AGP22087_03
SCALE:	AS INDICATED @ A4
DATE:	02-08-2022

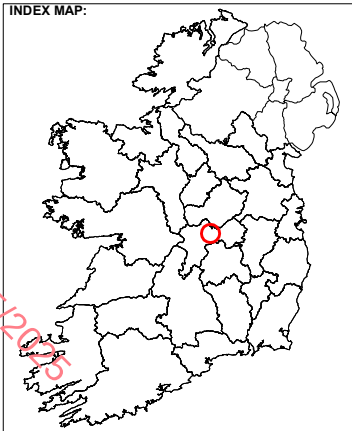
Version:	Date:	Drawn By:	Checked:
001	02-08-2022	POC	YOC

ERT PROFILE R1 and SEISMIC PROFILE S1 RESULTS AND INTERPRETATION

SCALE 1:2500



INDEX MAP:



LEGEND:

- Topsoil and silty SAND/GRAVEL
- Clayey silty SAND/GRAVEL
- SAND/GRAVEL
- Silty SAND/GRAVEL
- DARK LIMESTONE/MUDSTONE
- LIMESTONE
- 1254-1288 m/s Seismic refraction layer with velocity in metres/second

The information displayed here is to be used in conjunction with AGP22087_01 Report on the Geophysical Investigation at Agall, Tullamore for Malone O'Regan Env. Ltd., APEX Geophysics Ltd. 2nd August 2022.

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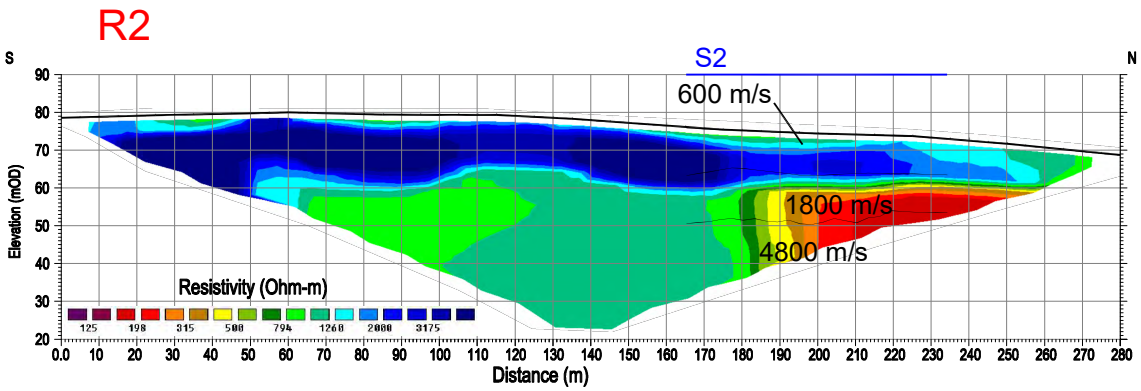
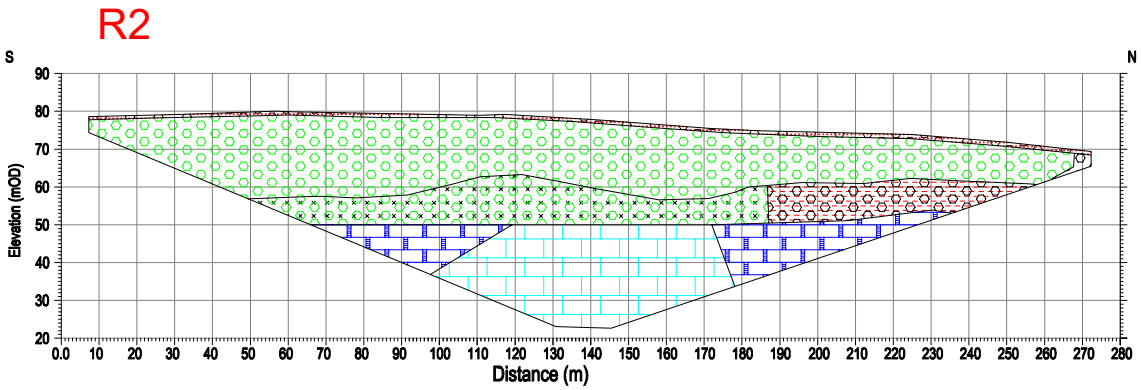
PROJECT:	AGALL TULLAMORE GEOPHYSICAL SURVEY
CLIENT.:	MALONE O'REGAN ENVIRONMENTAL
DRAWING NO:	AGP22020_R1
SCALE:	AS INDICATED @ A4
DATE:	29-07-2022

Version:	Date:	Drawn By:	Checked:
001	29-07-2022	POC	YOC

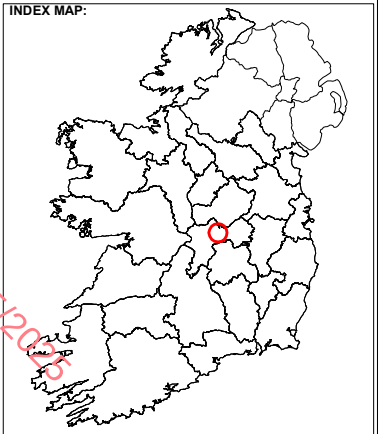
ERT PROFILE R2 and SEISMIC PROFILE S2 RESULTS AND INTERPRETATION

SCALE 1:2000





INDEX MAP:



LEGEND:

- Topsoil and silty SAND/GRAVEL
- Clayey silty SAND/GRAVEL
- SAND/GRAVEL
- Silty SAND/GRAVEL
- DARK LIMESTONE/MUDSTONE
- LIMESTONE
- 1254-1288 m/s Seismic refraction layer with velocity in metres/second

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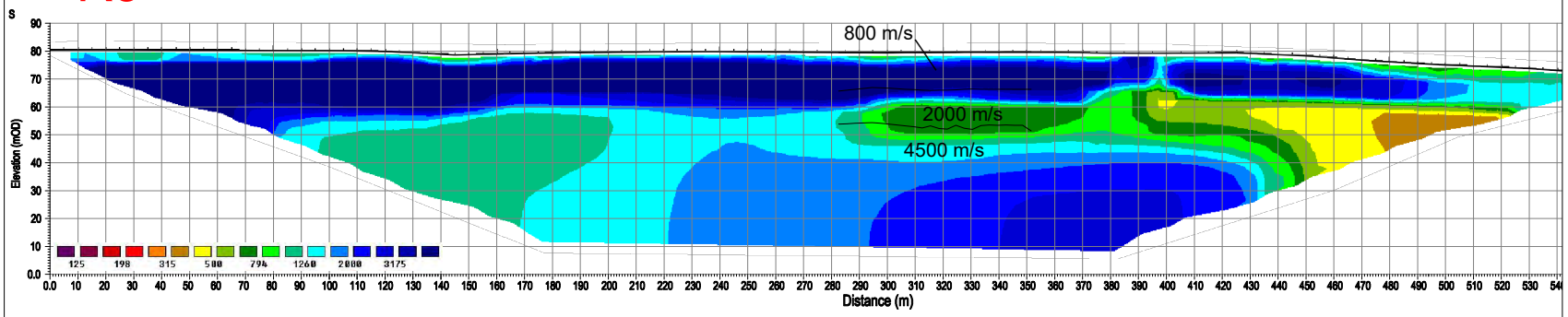
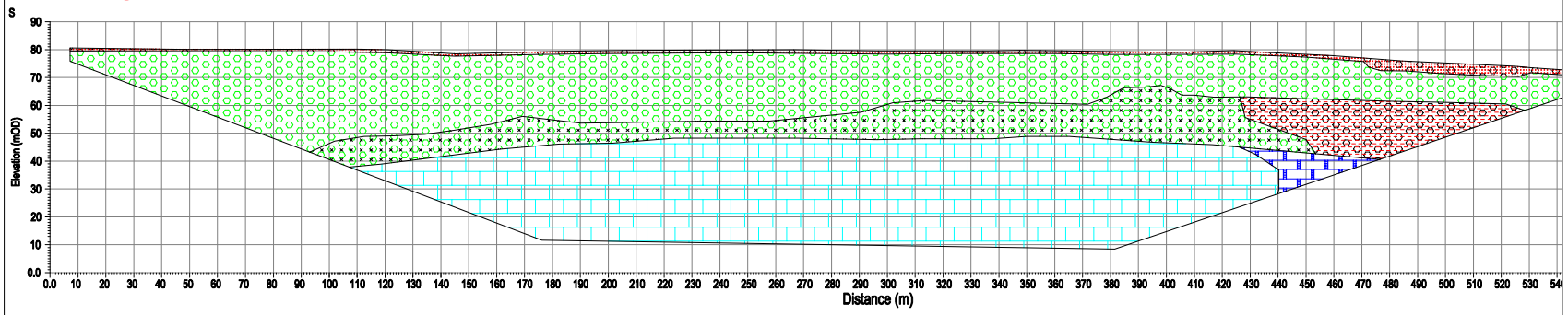
PROJECT:	AGALL TULLAMORE GEOPHYSICAL SURVEY
CLIENT:	MALONE O'REGAN ENVIRONMENTAL
DRAWING NO:	AGP22020_R2
SCALE:	AS INDICATED @ A4
DATE:	29-07-2022

Version:	Date:	Drawn By:	Checked:
001	29-07-2022	POC	YOC

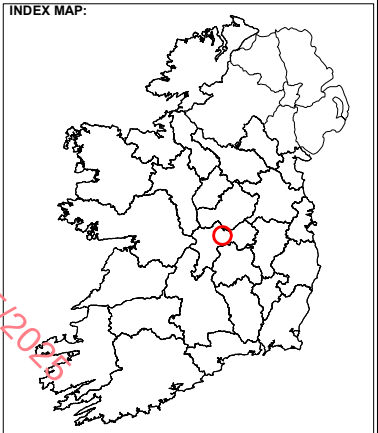
ERT PROFILE R3 and SEISMIC PROFILE S3 RESULTS AND INTERPRETATION

SCALE 1:2500





INDEX MAP:



LEGEND:

- Topsoil and silty SAND/GRAVEL
- Clayey silty SAND/GRAVEL
- SAND/GRAVEL
- Silty SAND/GRAVEL
- DARK LIMESTONE/MUDSTONE
- LIMESTONE
- Seismic refraction layer with velocity in metres/second (1254-1288 m/s)

The information displayed here is to be used in conjunction with AGP22087_01 Report on the Geophysical Investigation at Agall, Tullamore for Malone O'Regan Env. Ltd., APEX Geophysics Ltd. 2nd August 2022.

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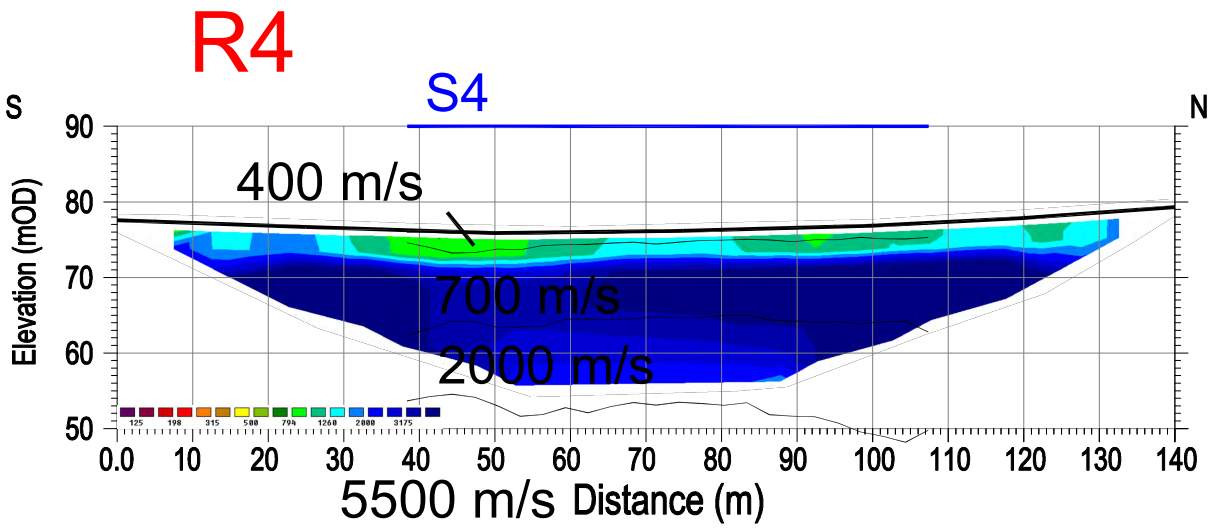
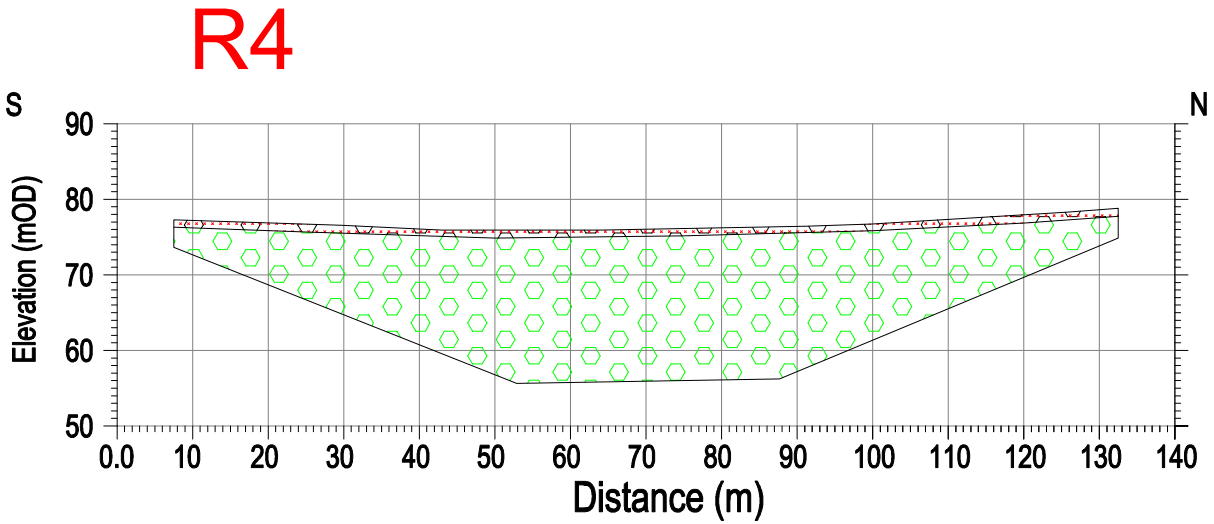
PROJECT:	AGALL TULLAMORE GEOPHYSICAL SURVEY
CLIENT.:	MALONE O'REGAN ENVIRONMENTAL
DRAWING NO:	AGP22020_R3
SCALE:	AS INDICATED @ A4
DATE:	29-07-2022

Version:	Date:	Drawn By:	Checked:
001	29-07-2022	POC	YOC

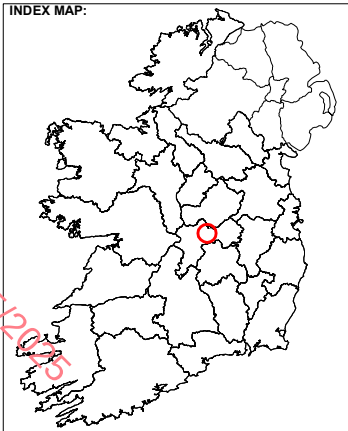
ERT PROFILE R4 and SEISMIC PROFILE S4 RESULTS AND INTERPRETATION

SCALE 1:1000





INDEX MAP:



LEGEND:

- Topsoil and silty SAND/GRAVEL
- Clayey silty SAND/GRAVEL
- SAND/GRAVEL
- Silty SAND/GRAVEL
- DARK LIMESTONE/MUDSTONE
- LIMESTONE
- Seismic refraction layer with velocity in metres/second (1254-1288 m/s)

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PROJECT:	AGALL TULLAMORE GEOPHYSICAL SURVEY
CLIENT.:	MALONE O'REGAN ENVIRONMENTAL
DRAWING NO:	AGP22020_R4
SCALE:	AS INDICATED @ A4
DATE:	29-07-2022

Version:	Date:	Drawn By:	Checked:
001	29-07-2022	POC	YOC

APPENDIX C: SEISMIC PLATES

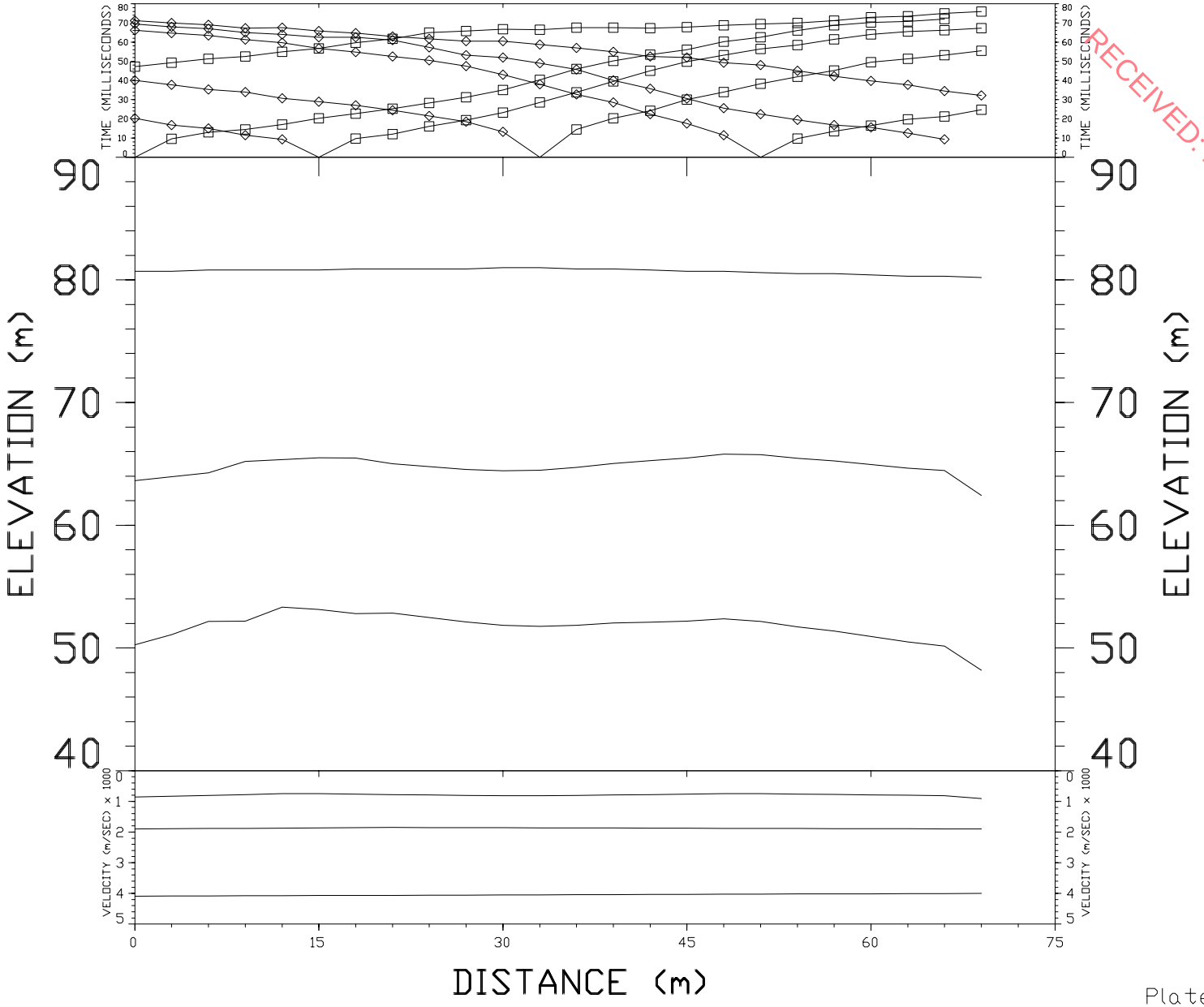


Plate: 10a

for: Malone O'Regan Environmental	AGP22087
by: APEX Geophysics Ltd.,	Agall, Tullamore Offaly
Data SetS1 / Date: July 2022	
Equipment: Geode / Spread: S1	Azimuth:

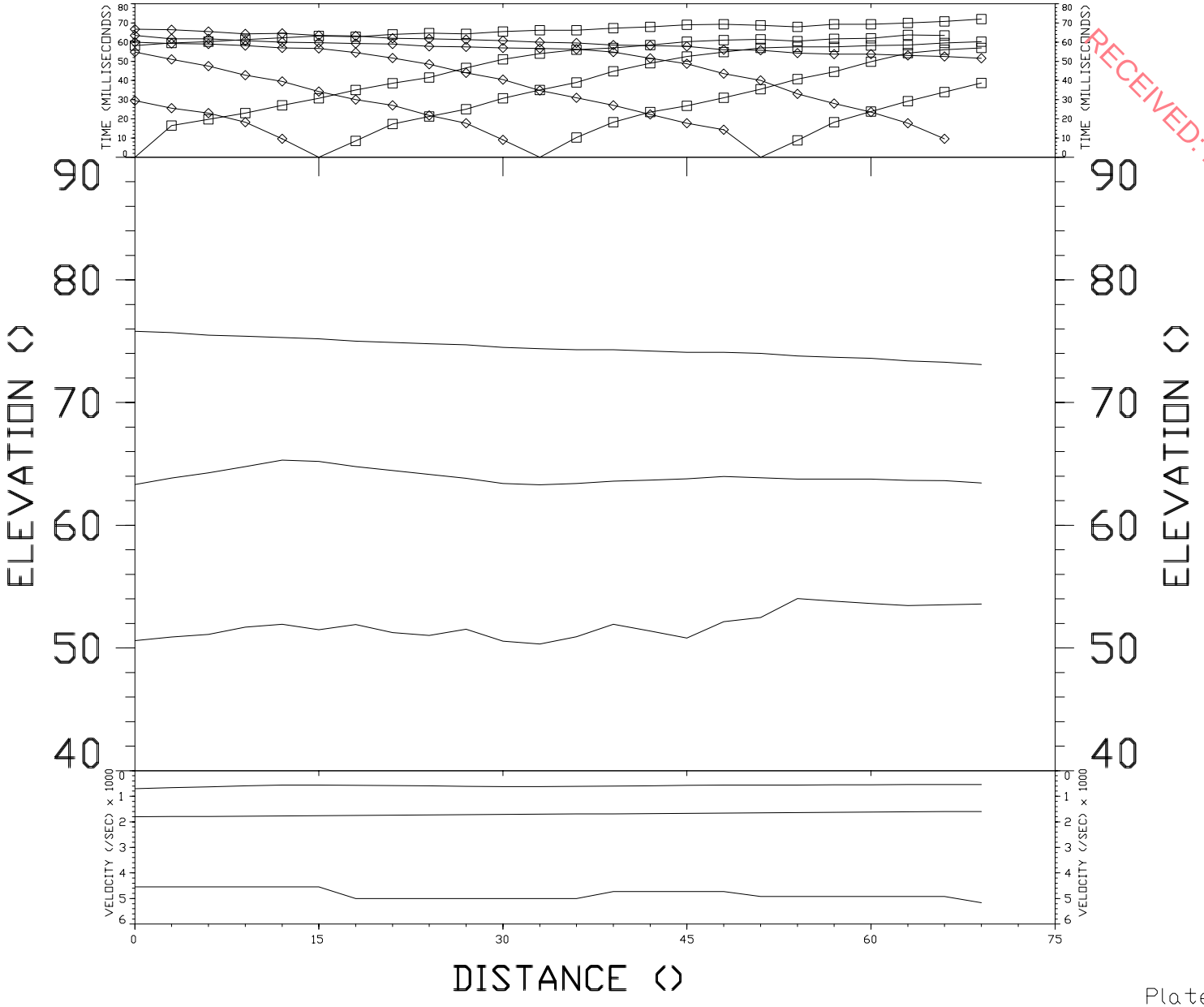


Plate: 10a

for: Malone O'Regan Environmental	AGP22087
by: APEX Geophysics Ltd..	Agall, Tullamore Offaly
Data SetS2 / Date: July 2022	
Equipment: Geode / Spread: S2	Azimuth:

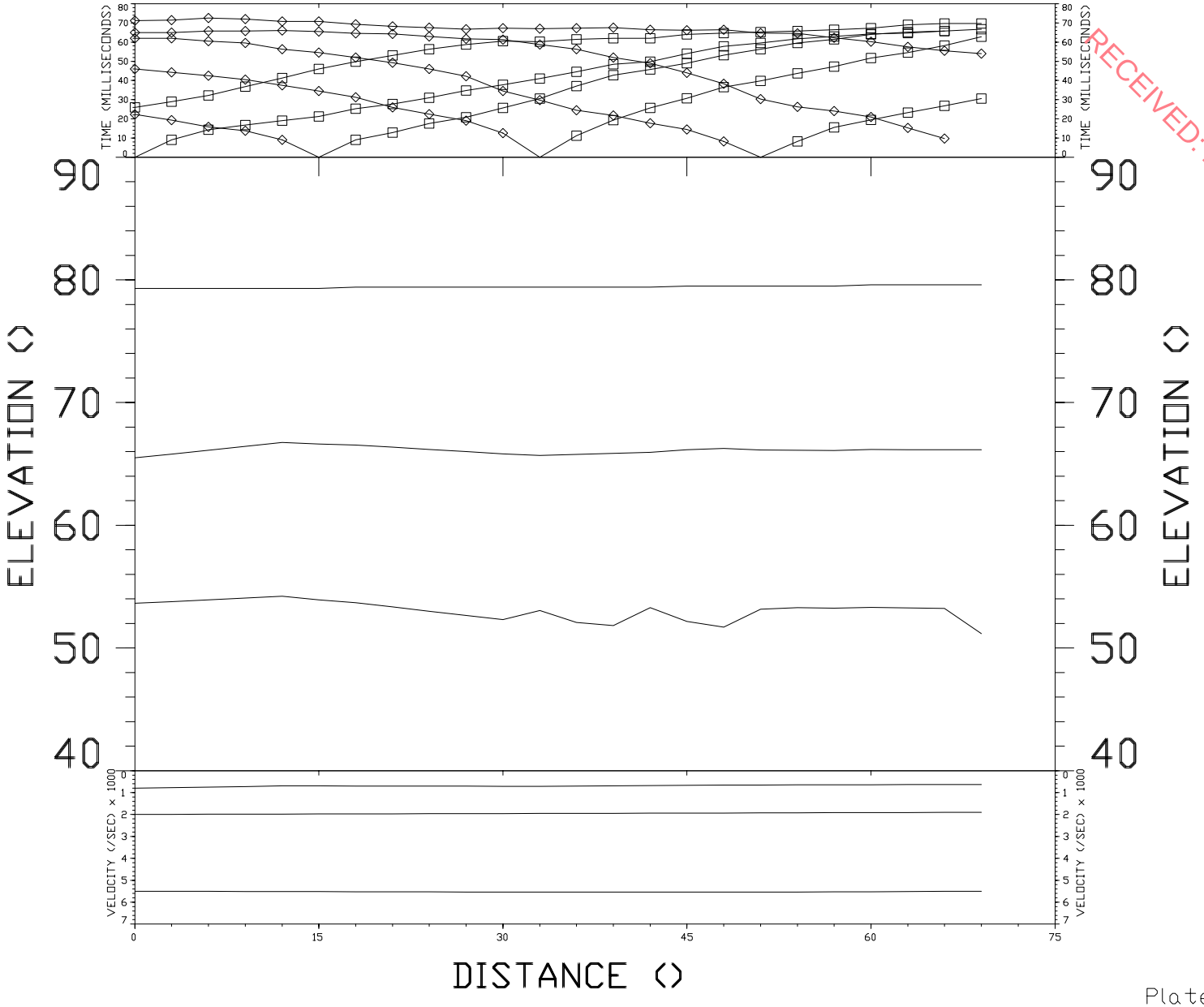


Plate: 10a

for: Malone O'Regan Environmental	AGP22087
by: APEX Geophysics Ltd..	Agall, Tullamore Offaly
Data SetS3 / Date: July 2022	
Equipment: Geode / Spread: S3	Azimuth:

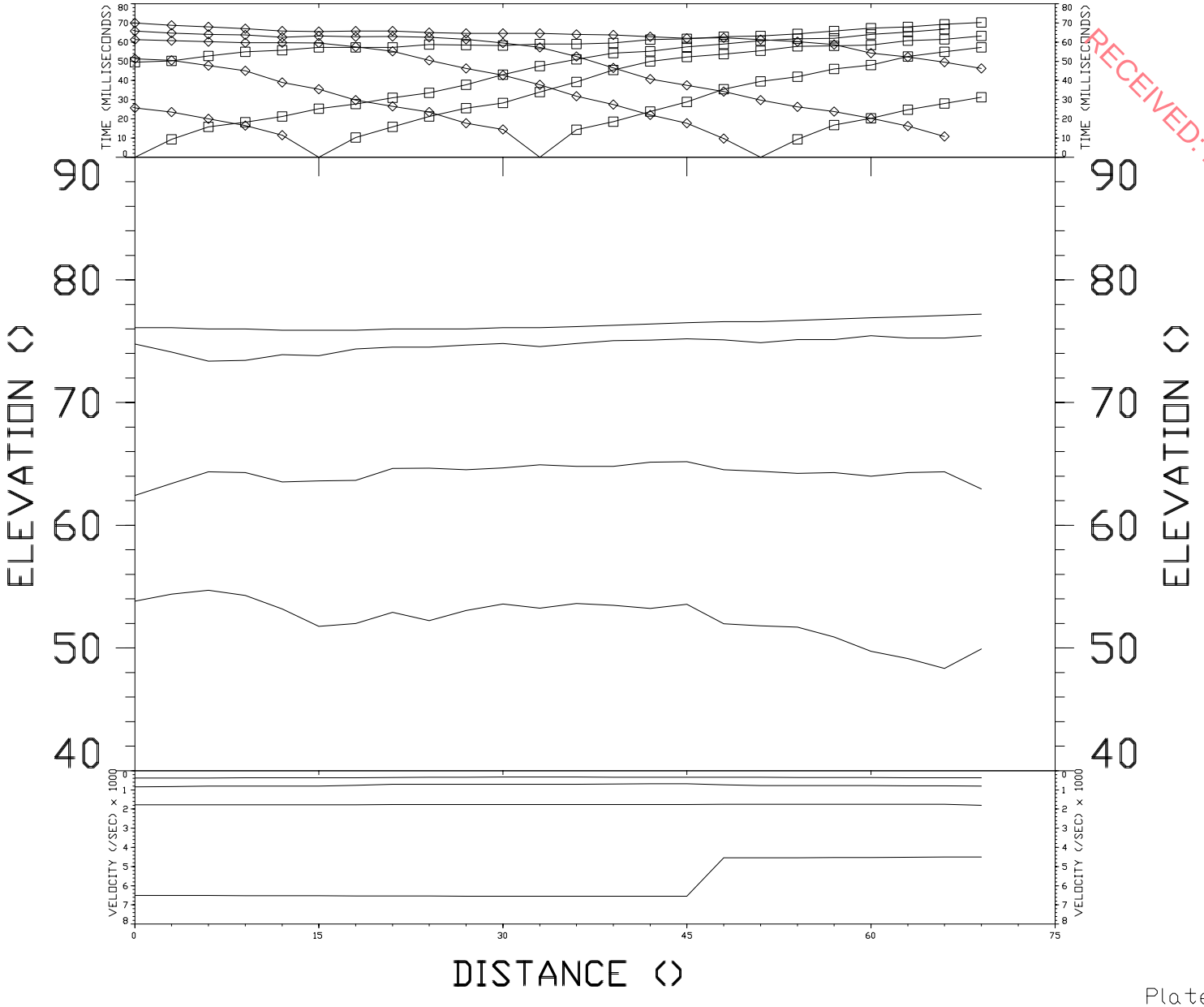


Plate: 10a

for: Malone O'Regan Environmental	AGP22087
by: APEX Geophysics Ltd..	Agall, Tullamore Offaly
Data SetS4 / Date: July 2022	
Equipment: Geode / Spread: S4	Azimuth:

APPENDIX 8

RECEIVED: 23/05/2025

APPENDIX 8-1

Condron Concrete Limited
Agall, Tullamore
Co. Offally

E1841 - Bi-annual Groundwater Monitoring Programme
Table 1 Groundwater Analytical Results

Sample Identity		Groundwater Generic Assessment Criteria		Drinking Water Assessment Criteria	MW1A										
Laboratory Report No.		Groundwater Regulations 2010 (S.I. No. 9 of 2010) as amended (S.I. No. 149 of 2012, S.I. No. 366 of 2016 and S.I. 287 of 2022)	EPA Interim Guideline Value (IGV) for Groundwater (EPA, 2003)	European Union (Drinking Water) Regulations 2023 (S.I. No. 99 of 2023)	17/14657	18/9766	18/19605	19/9610	20-7703	21/9225	21/19333	22/11634	22/18430	23/10495	23/17764
Sample Date					30/08/2017	21/06/2018	03/12/2018	13/06/2019	16/06/2020	18/06/2021	03/12/2021	12/07/2022	08/11/2022	27/06/2023	24/10/2023
Parameters	**Unit**														
Field Measured Parameters															
pH	pH Units	-	≥6.50 - ≤9.5	≥6.50 - ≤9.5	7.35	7.19	7.14	7.86	7.72	7.96	7.49	-	7.1	7.5	7.4
Temperature	°C	-	25	-	13.68	12.79	10.18	11.16	12.70	-	9.16	-	11.03	13.7	16.96
Electrical Conductivity (EC)	µS/cm	800 - 1875	1000	2500	338.53	308.25	252.57	331.20	283.04	325	323.86	-	377.7	224.09	289.99
Dissolved Oxygen	%	-	-	-	93.48	93.32	91.12	91.12	95.14	108.93	92.77	-	93.02	94.27	95.02
Indicators, Inorganics and Nutrients															
Ammoniacal Nitrogen as N	mg N/l	0.065	0.15	0.50	<0.03	<0.03	<0.03	0.03		0.05	<0.03	0.03	<0.03	<0.03	<0.03
Ammoniacal Nitrogen as NH4	mg/l	-	-	-	0.03	<0.03	0.03	0.04		0.06	<0.03	0.04	0.03	<0.03	<0.03
Nitrate as NO3	mg/l	37.5	25	50	4.3	3.7	2.4	3.8		2.9	2.9	10	2.1	5	5.7
MRP/Orthophosphate as PO4	mg/l	-	0.03	-	<0.06	<0.06	<0.06	<0.06		<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
MRP/Orthophosphate as P	mg P/l	0.035	-	-	<0.06	<0.06	<0.03	<0.03							
Chloride	mg/l	187.5	30	250	7.8	8.1	7.9	10.2		5.3	5.9	28.3	5.6	6.1	5.3
Sulphate as SO4	mg/l	187.5	200	250	3.7	11.7	2.5	2.5		3.4	3.5	10.9	3.6	6.3	2.4
Petroleum Hydrocarbons															
MTBE	µg/l	10	30	-	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Benzene	µg/l	0.75	1	1	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Toluene	µg/l	525	10	-	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Ethylbenzene	µg/l	-	10	-	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
m/p-Xylene	µg/l	-	10	-	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
o-Xylene	µg/l	-	10	-	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Total Petroleum Hydrocarbons (TPH-CWG)															
Aliphatics															
>C5-C6	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>C6-C8	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>C8-C10	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>C10-C12	µg/l	-	-	-	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
>C12-C16	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>C16-C21	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>C21-C35	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
Total aliphatics C5-35	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
Aromatics															
>C5-EC7	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>EC7-EC8	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>EC8-EC10	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>EC10-EC12	µg/l	-	-	-	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
>EC12-EC16	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>EC16-EC21	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
>EC21-EC35	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
Total aromatics C5-35	µg/l	-	-	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics C5-35	µg/l	7.5	10	-	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10

Notes:

Bold denotes value exceeds relevant standards/thresholds

Underlined denotes value exceeds IGV - only used in the absence of available groundwater / drinking water regulation

- : Not Applicable

NDP - No determination Possible; Not enough sample to determine the parameters

# denotes lower value - assessment for the presence of saline/other instrusion; higher value - assessment of the general quality of groundwater in terms of whether its ability to support human uses has been significantly impaired by pollution.

Condron Concrete Limited
Agall, Tullamore
Co. Offally

E1841 - Bi-annual Groundwater Monitoring Programme
Table 1 Groundwater Analytical Results

Sample Identity		Groundwater Generic Assessment Criteria		MW2A				MW3A			
Laboratory Report No.		Groundwater Regulations 2010 (S.I. No. 9 of 2010) as amended (S.I. No. 149 of 2012, S.I. No. 366 of 2016 and S.I. 287 of 2022)	EPA Interim Guideline Value (IGV) for Groundwater (EPA, 2003)					17/14657	18/9766	18/19605	
Sample Date				30/08/2017	21/06/2018	03/12/2018	13/06/2019	30/08/2017	21/06/2018	03/12/2018	13/06/2019
Parameters	**Unit**										
Field Measured Parameters											
pH	pH Units	-	≥6.50 - ≤9.5	NDP	NDP	NDP	NDP	NDP	7.09	7.04	NDP
Temperature	°C	-	25	NDP	NDP	NDP	NDP	NDP	13.31	10.10	NDP
Electrical Conductivity (EC)	µS/cm	800 - 1875	1000	NDP	NDP	NDP	NDP	NDP	456.46	343.91	NDP
Dissolved Oxygen	%	-	-	NDP	NDP	NDP	NDP	NDP	94.85	87.60	NDP
Indicators, Inorganics and Nutrients											
Ammoniacal Nitrogen as N	mg N/l	0.065	0.15	NDP	NDP	NDP	NDP	<0.03	<0.03	<0.03	NDP
Ammoniacal Nitrogen as NH4	mg/l	-	-	NDP	NDP	NDP	NDP	<0.03	<0.03	<0.03	NDP
Nitrate as NO3	mg/l	37.5	25	NDP	NDP	NDP	NDP	21.6	12	14.4	NDP
MRP/Orthophosphate as PO4	mg/l	-	0.03	NDP	NDP	NDP	NDP	<0.06	<0.06	<0.06	NDP
MRP/Orthophosphate as P	mg P/l	0.035	-	NDP	NDP	NDP	NDP	<0.06	<0.06	<0.03	NDP
Chloride	mg/l	187.5	30	NDP	NDP	NDP	NDP	98.8	37	47.1	NDP
Sulphate as SO4	mg/l	187.5	200	NDP	NDP	NDP	NDP	6.5	6.8	7.5	NDP
Petroleum Hydrocarbons											
MTBE	µg/l	10	30	NDP	NDP	NDP	NDP	<5	<5	<5	NDP
Benzene	µg/l	0.75	1	NDP	NDP	NDP	NDP	<5	<5	<5	NDP
Toluene	µg/l	525	10	NDP	NDP	NDP	NDP	<5	<5	<5	NDP
Ethylbenzene	µg/l	-	10	NDP	NDP	NDP	NDP	<5	<5	<5	NDP
m/p-Xylene	µg/l	-	10	NDP	NDP	NDP	NDP	<5	<5	<5	NDP
o-Xylene	µg/l	-	10	NDP	NDP	NDP	NDP	<5	<5	<5	NDP
Total Petroleum Hydrocarbons (TPH-CWG)											
Aliphatics											
>C5-C6	µg/l	-	-	NDP	NDP	NDP	NDP	<10	<10	<10	NDP
>C6-C8	µg/l	-	-	NDP	NDP	NDP	NDP	<10	<10	<10	NDP
>C8-C10	µg/l	-	-	NDP	NDP	NDP	NDP	<10	<10	<10	NDP
>C10-C12	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<5	<5	NDP
>C12-C16	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
>C16-C21	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
>C21-C35	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
Total aliphatics C5-35	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
Aromatics											
>C5-EC7	µg/l	-	-	NDP	NDP	NDP	NDP	<10	<10	<10	NDP
>EC7-EC8	µg/l	-	-	NDP	NDP	NDP	NDP	<10	<10	<10	NDP
>EC8-EC10	µg/l	-	-	NDP	NDP	NDP	NDP	<10	<10	<10	NDP
>EC10-EC12	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<5	<5	NDP
>EC12-EC16	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
>EC16-EC21	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
>EC21-EC35	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
Total aromatics C5-35	µg/l	-	-	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP
Total aliphatics and aromatics C5-35	µg/l	7.5	10	NDP	NDP	NDP	NDP	NDP	<10	<10	NDP

Notes:
Bold denotes value exceeds relevant standards/thresholds
Underlined denotes value exceeds IGV - only used in the absence of available groundwater / drinking water regulation
- : Not Applicable
NDP - No determination Possible; Not enough sample to determine the parameters
# denotes lower value - assessment for the presence of saline/other instrusion; higher value - assessment of the general quality of groundwater in terms of whether its ability to support human uses has been significantly impaired by pollution.

Condron Concrete Limited
Agall, Tullamore
Co. Offally

E1841 - Bi-annual Groundwater Monitoring Programme
Table 1 Groundwater Analytical Results

Sample Identity		Groundwater Generic Assessment Criteria		MW3B									
Laboratory Report No.		Groundwater Regulations 2010 (S.I. No. 9 of 2010) as amended (S.I. No. 149 of 2012, S.I. No. 366 of 2016 and S.I. 287 of 2022)	EPA Interim Guideline Value (IGV) for Groundwater (EPA, 2003)	17/14657	18/9766	18/19605	19/9610	21/9225	21/19333	22/10611	22/18430	23/10495	23/17764
Sample Date				30/08/2017	21/06/2018	03/12/2018	13/06/2019	18/06/2021	03/12/2021	24/06/2022	08/11/2022	27/06/2023	24/10/2023
Parameters	**Unit**												
Field Measured Parameters													
pH	pH Units	-	≥6.50 - ≤9.5	7.52	7.28	7.15	7.83	7.80	7.3	7.72	7.17	7.23	6.89
Temperature	°C	-	25	17.28	13.45	10.40	11.06	-	9.07	18.21	11.40	16.38	11.52
Electrical Conductivity (EC)	µS/cm	800 - 1875	1000	439.95	443.35	330.50	333.17	475.00	446.99	514.00	572.90	463.53	563.12
Dissolved Oxygen	%	-	-	32.95	60.22	31.53	64.64	108.93	80.99	99.67	105.09	95.35	63.72
Indicators, Inorganics and Nutrients													
Ammoniacal Nitrogen as N	mg N/l	0.065	0.15	0.03	<0.03	<0.03	<0.03	0.05	<0.03	0.03	0.06	<0.03	<0.03
Ammoniacal Nitrogen as NH4	mg/l	-	-	0.04	<0.03	<0.03	<0.03	0.07	<0.03	0.04	0.08	<0.03	<0.03
Nitrate as NO3	mg/l	37.5	25	8.9	6.7	4.3	5	5.3	5	10.5	6.6	7.4	8.4
MRP/Orthophosphate as PO4	mg/l	-	0.03	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.1
MRP/Orthophosphate as P	mg P/l	0.035	-	<0.06	<0.06	<0.03	<0.03						
Chloride	mg/l	187.5	30	30.8	40.9	37.7	22.9	11.3	10.4	22.9	15.7	14.3	14.8
Sulphate as SO4	mg/l	187.5	200	23.3	22.7	17.4	12.2	8.1	9.4	11.7	14.2	9.8	12.4
Petroleum Hydrocarbons													
MTBE	µg/l	10	30	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Benzene	µg/l	0.75	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	µg/l	525	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	µg/l	-	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
m/p-Xylene	µg/l	-	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	µg/l	-	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Petroleum Hydrocarbons (TPH-CWG)													
Aliphatics													
>C5-C6	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C6-C8	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C8-C10	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C10-C12	µg/l	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
>C12-C16	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C16-C21	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C21-C35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total aliphatics C5-35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics													
>C5-EC7	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC7-EC8	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC8-EC10	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC10-EC12	µg/l	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
>EC12-EC16	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC16-EC21	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC21-EC35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total aromatics C5-35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics C5-35	µg/l	7.5	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Notes:
Bold denotes value exceeds relevant standards/thresholds
Underlined denotes value exceeds IGV - only used in the absence of available groundwater / drinking water regulation
- : Not Applicable
NDP - No determination Possible; Not enough sample to determine the parameters
# denotes lower value - assessment for the presence of saline/other instrusion; higher value - assessment of the general quality of groundwater in terms of whether its ability to support human uses has been significantly impaired by pollution.

Condron Concrete Limited
Agall, Tullamore
Co. Offally

E1841 - Bi-annual Groundwater Monitoring Programme
Table 1 Groundwater Analytical Results

Sample Identity		Groundwater Generic Assessment Criteria		PW1									PW1	
Laboratory Report No.		Groundwater Regulations 2010 (S.I. No. 9 of 2010) as amended (S.I. No. 149 of 2012, S.I. No. 366 of 2016 and S.I. 287 of 2022)	EPA Interim Guideline Value (IGV) for Groundwater (EPA, 2003)	17/14657	18/9766	18/19605	19/9610	21/9225	21/19333	22/9613	23/10495	23/17764	23/10495	23/17764
Sample Date				30/08/2017	21/06/2018	03/12/2018	13/06/2019	18/06/2021	03/12/2021	10/06/2022	27/06/2023	24/10/2023	27/06/2023	24/10/2023
Parameters	**Unit**													
Field Measured Parameters														
pH	pH Units	-	≥6.50 - ≤9.5	7.12	7.12	7.13	7.77	7.57	7.17	7.45	7.15	**6.19**	7.13	7.52
Temperature	°C	-	25	12.08	11.59	11.52	11.61	-	11.38	14.41	15.50	11.29	16.66	13.35
Electrical Conductivity (EC)	µS/cm	800 - 1875	1000	390.79	495.20	309.95	368.44	610.00	479.16	515.77	478.47	745.16	409.35	338.84
Dissolved Oxygen	%	-	-	43.94	67.93	40.98	46.91	96.82	24.78	39.67	51.07	92.88	97.66	70.25
Indicators, Inorganics and Nutrients														
Ammoniacal Nitrogen as N	mg N/l	0.065	0.15	<0.03	<0.03	<0.03	<0.03	**0.34**	<0.03	<0.03	<0.03	<0.03	0.03	0.05
Ammoniacal Nitrogen as NH4	mg/l	-	-	<0.03	<0.03	<0.03	<0.03	0.44	<0.03	0.03	<0.03	<0.03	0.04	0.06
Nitrate as NO3	mg/l	37.5	25	8.5	12.2	8.6	11.2	9	9.60	8.8	11.3	11.20	12.8	10.1
MRP/Orthophosphate as PO4	mg/l	-	0.03	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
MRP/Orthophosphate as P	mg P/l	0.035	-	<0.06	<0.06	<0.03	<0.03						<0.06	<0.06
Chloride	mg/l	187.5	30	9.3	14.9	9.1	14.2	15.8	9.30	10.2	10.8	15.40	13	12.6
Sulphate as SO4	mg/l	187.5	200	19.3	16.8	16	13.5	14.2	19.80	19.8	16.3	14.10	4	4.4
Petroleum Hydrocarbons														
MTBE	µg/l	10	30	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Benzene	µg/l	0.75	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	µg/l	525	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	µg/l	-	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
m/p-Xylene	µg/l	-	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	µg/l	-	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Petroleum Hydrocarbons (TPH-CWG)														
Aliphatics														
>C5-C6	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C6-C8	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C8-C10	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C10-C12	µg/l	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
>C12-C16	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C16-C21	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C21-C35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total aliphatics C5-35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics														
>C5-EC7	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC7-EC8	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC8-EC10	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC10-EC12	µg/l	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
>EC12-EC16	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC16-EC21	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC21-EC35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total aromatics C5-35	µg/l	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics C5-35	µg/l	7.5	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Notes:
Bold denotes value exceeds relevant standards/thresholds
Underlined denotes value exceeds IGV - only used in the absence of available groundwater / drinking water regulation
- : Not Applicable
NDP - No determination Possible; Not enough sample to determine the parameters
# denotes lower value - assessment for the presence of saline/other instrusion; higher value - assessment of the general quality of groundwater in terms of whether its ability to support human uses has been significantly impaired by pollution.

APPENDIX 8-2

Groundwater Monitoring Programme
Condron Concrete Limited
Agall, Tullamore
Co. Offaly

Table 8-2: Groundwater Level Measurements

Well ID	Well Installed (Date)	Elevation of Reference	Total Depth	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)
		mAOD	mbtoci	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD
				30/08/2017		14/09/2017		25/10/2017		15/11/2017		13/12/2017		25/01/2018		21/02/2018		14/03/2018		18/04/2018		17/05/2018		21/06/2018	
MW1A	23/08/2017	78.770	24.20	18.45	60.32	18.56	60.21	18.53	60.24	18.10	60.67	18.52	60.25	18.25	60.52	18.00	60.77	17.83	60.94	17.88	60.89	17.89	60.88	17.69	61.08
MW2A	23/08/2017	79.810	23.10	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71	22.14	57.67	21.76	58.05	21.19	58.62	21.84	57.97	22.02	57.79	22.37	57.44
MW3A	22/08/2017	79.710	24.40	24.00	55.71	23.99	55.72	23.98	55.73	23.87	55.84	24.05	55.66	23.02	56.69	22.17	57.54	22.68	57.03	21.89	57.82	21.59	58.12	21.74	57.97
MW3B	21/08/2017	79.760	49.30	25.60	54.16	27.62	52.14	24.89	54.87	26.88	52.88	23.82	55.94	23.13	56.63	22.82	56.94	22.71	57.05	22.90	56.86	23.09	56.67	23.34	56.42
PW1	-	63.820	50.40	8.59	55.23	8.51	55.31	8.27	55.55	8.14	55.68	7.72	56.10	7.10	56.72	6.95	56.87	6.86	56.96	6.91	56.91	7.19	56.63	7.19	56.63

Well ID	Well Installed (Date)	Elevation of Reference	Total Depth	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)
		mAOD	mbtoci	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc	mbtoc
				11/07/2018		16/08/2018		11/09/2018		17/10/2018		13/11/2018		03/12/2018		23/01/2019		28/02/2019		20/03/2019		29/04/2019		13/05/2019	
MW1A	23/08/2017	78.770	24.20	17.89	60.88	17.87	60.90	17.98	60.79	17.98	60.79	18.07	60.70	18.07	60.70	18.11	60.66	18.25	60.52	18.33	60.44	18.16	60.61	18.06	60.71
MW2A	23/08/2017	79.810	23.10	22.57	57.24	22.72	57.09	22.73	57.08	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71
MW3A	22/08/2017	79.710	24.40	21.30	58.41	21.44	58.27	21.41	58.30	21.90	57.81	21.99	57.72	22.14	57.57	22.19	57.52	21.99	57.72	21.95	57.76	21.76	57.95	21.64	58.07
MW3B	21/08/2017	79.760	49.30	23.67	56.09	24.23	55.53	24.18	55.58	24.89	54.87	25.02	54.74	25.05	54.71	22.10	57.66	23.98	55.78	23.64	56.12	23.44	56.32	23.59	56.17
PW1	-	63.820	50.40	7.65	56.17	8.02	55.80	8.04	55.78	8.40	55.42	8.42	55.40	8.37	55.45	8.41	55.41	7.89	55.93	7.45	56.37	7.01	56.81	7.59	56.23

Well ID	Well Installed (Date)	Elevation of Reference (Valid from 12/07/22)	Total Depth	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)
		mAOD	mbtoci	mbtoci	mAOD	mbtoci	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD
				13/06/2019		10/07/2019		07/08/2019		16/06/2020		08/12/2020		18/06/2021		03/12/2021		10/06/2022		12/07/2022		08/11/2022		27/06/2023	
MW1A	23/08/2017	78.770	24.20	18.01	60.76	17.99	60.78	18.14	60.63	18.22	60.55	17.98	60.79	18.22	60.55	17.99	60.78	18.14	60.630	18.14	60.630	18.34	60.430	17.84	60.930
MW2A	23/08/2017	79.810	23.10	23.10	56.71	23.10	56.71	23.10	56.71	23.10	56.71	-	-	-	-	-	-	-	-	22.35	57.460	-	-		
MW3A	22/08/2017	80.590	24.40	22.19	57.52	22.19	57.52	21.77	57.94	21.77	57.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3B	21/08/2017	80.570	49.30	23.98	55.78	23.90	55.86	24.58	55.18	22.90	56.86	22.90	56.86	23.20	56.56	24.60	55.16	28.72	51.040	24.55	56.020	24.54	56.030	23.80	56.770
PW1	-	64.350	50.40	7.74	56.08	7.69	56.13	8.23	55.59	7.28	56.54	7.53	56.29	7.82	56.00	8.31	55.51	11.54	52.28	8.90	55.450	8.64	55.710	9.69	54.660
MW4	07/07/2023	80.790	23.49																					21.56	59.230
MW5	07/07/2023	71.780	14.55																						

Well ID	Well Installed (Date)	Elevation of Reference (Valid from 12/07/22)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)	Depth to Water	Water Level (Column of Water)
		mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD
			13/07/2023		10/10/2023		24/10/2023		08/11/2023		05/03/2024	
MW1A	23/08/2017	78.770	17.84	60.930	17.79	60.980	17.83	60.940	17.48	61.290	17.23	61.540
MW2A	23/08/2017	79.810	-	-	-	-	-	-	-		-	
MW3A	22/08/2017	80.590	-	-	-	-	-	-	-		-	
MW3B	21/08/2017	80.570	24.09	56.480	23.91	56.660	23.67	56.900	23.32	57.250	22.60	57.970
PW1	-	64.350	8.33	56.020	8.12	56.230	7.81	56.540	7.71	56.640	7.64	56.710
MW4	07/07/2023	80.790	21.01	59.780	21.95	58.840	20.93	59.860	21.92	58.870	20.66	60.130
MW5	07/07/2023	71.780	-	-		-	-	-	-		-	

Notes:

mAOD	denotes metres above ordnance datum.
mbtoc	denotes metres below top of outer casing.
mbtoci	denotes metres below top of inner casing.
-	denotes not available/not measured.

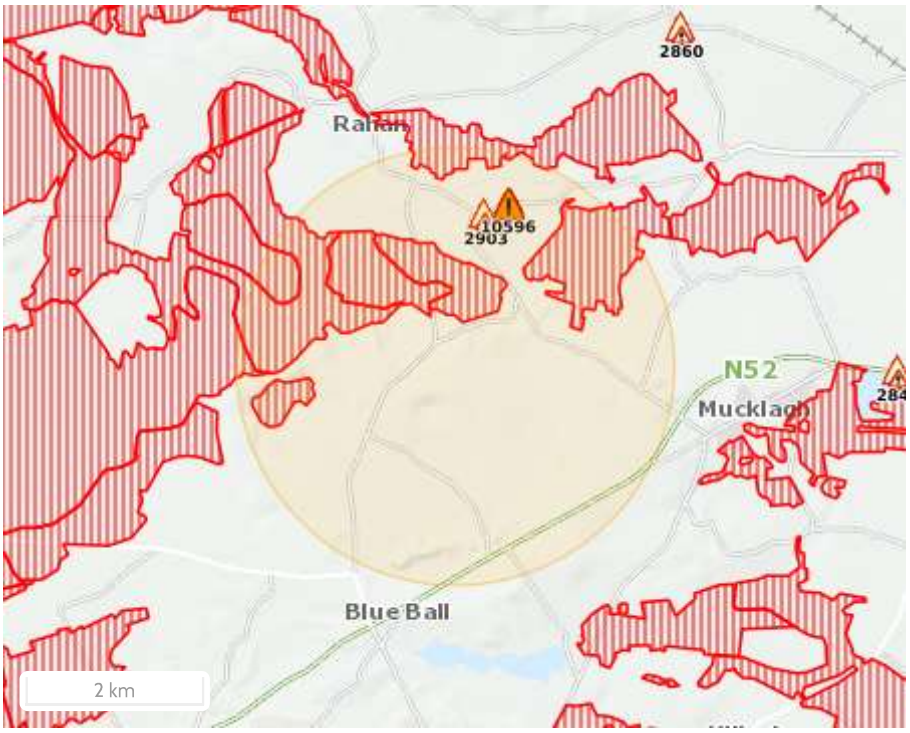
Elevation of reference is from casing

APPENDIX 8-3

Past Flood Event Local Area Summary Report

Report Produced: **7/3/2024 16:21**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

2 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Clodiagh Killina August 2008 (ID-10596)	16/08/2008	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Killina Recurring (ID-2903)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

MINUTES OF MEETING

Reference:	**P4D403A – F310 – 027 – 004-004**	**Page 1 of 3**
Project No.:	**P4D403A**	
Project Title:	**OPW Flood Hazard Mapping – Phase 1**	
Purpose of Meeting:	**Offaly County Council – Oral Report – Area Engineer – Ferbane**	
Participating:	**Area Engineer**	**Offaly County Council**
	Supervisor	**Offaly County Council**
	Search Manager	**ESBI**
Venue:	**Ferbane**	
Date of Meeting:	**01/11/05**	
Copies to:		
Compiled by:	**Search Manager ESBI**	
Status	**Draft**	
Approved for ESBI:		
Approved for Offaly County Council		
Date:		

Meeting with Ferbane Area Engineer

The Area Engineer and his supervisor outlined 13 areas that are liable to flood. These are: -

F1. Shanon Harbour – River Shannon overflows its banks every year after heavy rain. Road is liable to flood.
Flood Id = 2896
F2. Derryharan – River Shannon overflows its banks every year after heavy rain. Road is liable to flood.
Flood Id = 2897
F3. Shannonbridge – Low lying area close to the Shannon Flood plain flooded in 2003 due to drains being blocked. Council have undertaken remedial work
Flood Id = 2898
F4. Creevagh – River Shannon overflows its banks every year after heavy rain. Road is liable to flood.
Flood Id = 2899
F5. Bloomhill – River Shannon overflows its banks every year after heavy rain. Road is liable to flood.
Flood Id = 2900
F6. Pollagh – River Brosna overflows its banks every year after heavy rain. Road is liable to flood after very heavy rainfall.
Flood Id = 2901
F7. Ballycumber - Mill Race overflows its banks after very heavy rainfall and water flows down the road. Council have undertaken remedial work
Flood Id = 2902
F8. Killina – Low lying land floods after heavy rain every year. Road is liable to flood. Council have put in a soak pit.
Flood Id = 2903
F9. Fivealley - Low lying land floods after heavy rain every year. The water flows from surrounding land. Road is liable to flood. It is difficult to alleviate the flooding.
Flood Id = 2904
F10. Noggus – Low lying land floods after heavy rain every year. The water flows from bog. Road is liable to flood.
Flood Id = 2905
F11. Lemanaghan – – Low lying flat land floods after heavy rain every year. Road is liable to flood.
Flood Id = 2906
F12. Derrrica Beg - Low lying land floods after heavy rain every year. Road is liable to flood.
Flood Id = 2907
F13. Derryharney – – Low lying land and bog floods after heavy rain every year. Road is not liable to flood.
Flood Id = 2908

Flooding in Killina Co. Offaly 19th August 2008

After very heavy and prolonged rainfall in the Offaly area flooding occurred in several parts of the county.
Offaly County Council on 19th August 2008 took a series of aerial photographs of the flooded areas, the photographs were not taken at peak water levels.

APPENDIX 8-4

May 2025

Water Framework Directive Assessment Report

Proposed Extension to the Agall Quarry, The Rise, Co. Offaly

Condron Concrete Limited

Arden Road, Tullamore, Co. Offaly

MALONE O'REGAN ENVIRONMENTAL

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

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Title: Water Framework Directive Assessment Report, Proposed Extension to the Agall Quarry, The Rise, Co. Offaly, Condron Concrete Limited, Arden Road, Tullamore, Co. Offaly

Job Number: E2018

Prepared By: Damien Teague **Signed:** Damien Teague

Checked By: Laura McGrath **Signed:**

Approved By: Kenneth Goodwin **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	14/05/25	Report	Final	DT	LMG	KG

Water Framework Directive Assessment Report

Proposed Extension to the Agall Quarry, The Rise, Co. Offaly

Condron Concrete Limited

Arden Road, Tullamore, Co. Offaly

Contents

FIGURES

TABLES

1 INTRODUCTION

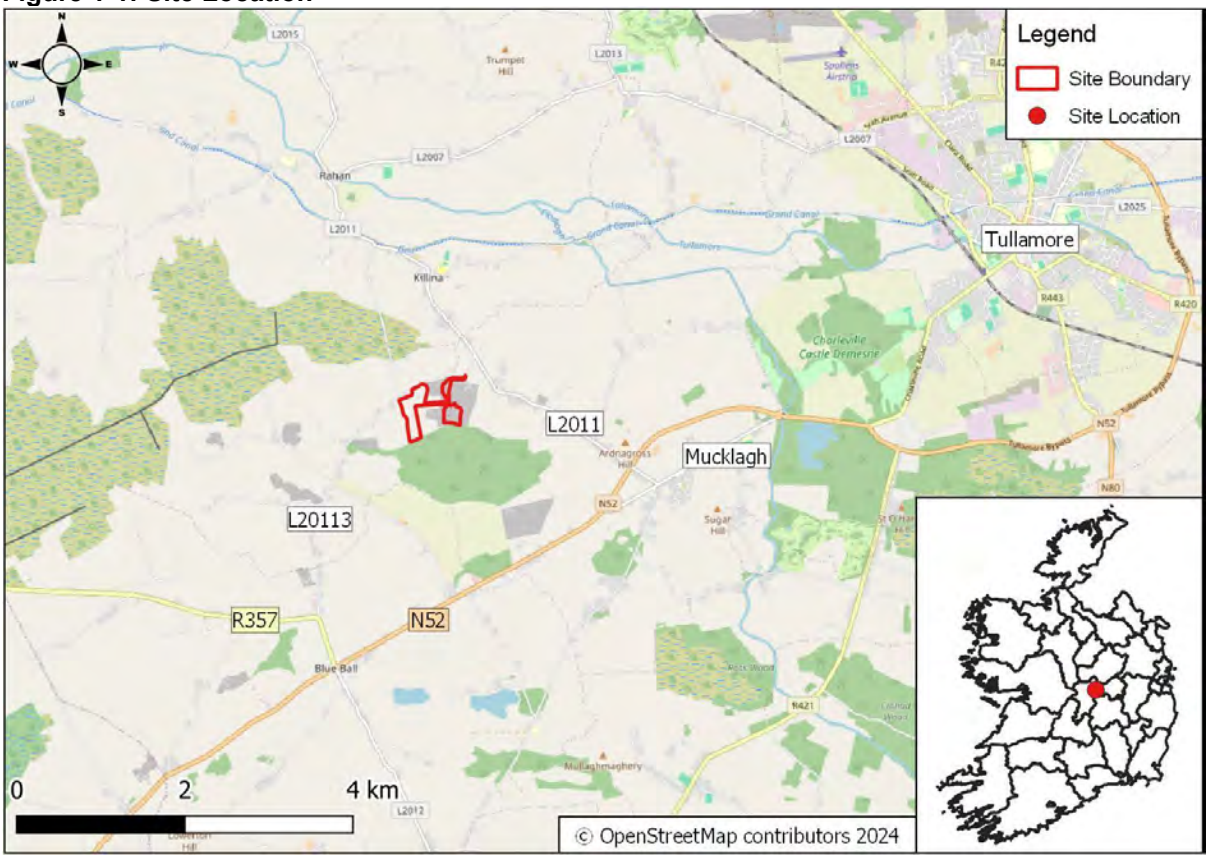
1.1 Background

Malone O'Regan Environmental ('MOR Environmental') was commissioned by Condron Concrete Limited ('the Applicant') to undertake a Water Framework Directive Assessment in support of a planning application to Offaly County Council ('OCC') for the proposed extension of the current active quarry into agricultural land to the west and north of the existing working face at the Agall Quarry, within the townlands of Agall and Glaskill, Co. Offaly, to a level of 63 metres Ordnance Datum ('mOD') within the proposed extraction areas (the 'Proposed Development'). Please see the main Environmental Impact Assessment Report ('EIAR') for further details.

The aim of this assessment is to ascertain whether the project has the potential to impact waterbodies in such a way as to result in a deterioration in that waterbody's status under the Water Framework Directive. If such impacts are found to be possible, then mitigation must be put in place.

The Proposed Development will be located on a site covering an area of circa ('ca.') 17 hectares (ha) within the townland Agall and Glaskill, Co Offaly (Ordnance Survey Ireland Grid Reference ITM 626611, 722998), refer to the redline boundary presented in Figure 1-1 below for context. The Site is located ca. 6.0km southwest of Tullamore.

Figure 1-1: Site Location



1.2 Regulatory Context Overview

1.2.1 EU Legislation - Water Framework Directive

The Water Framework Directive ('WFD') (2000/60/EC) [1], as amended by Decision No. 2455/2001/EC and Directives 2008/105/EC, 2013/39/EU and 2014/101/EU, requires EU Member States to protect and improve water quality. It applies to all surface waters (defined as inland waters, both standing and flowing and includes rivers, lakes, reservoirs, streams and canals), groundwater, transitional waters (estuarine) and coastal waters. This includes both natural and "artificial and heavily modified bodies of water" ('artificial' is defined in Article 2(8) as 'a body of surface water created by human activity' and 'heavily modified' is defined in Article 2(9) as 'a body of surface water which as a result of physical alternations by human activity is substantially changed in character').

The long-term aim of the Directive is for all groundwater and surface water within the EU to achieve 'good' status (see section 1.4 below). The WFD was given legal status in Ireland via the European Communities (Water Policy) Regulations 2003 (S.I. 722/2003) [2].

Article 1 of the Directive sets out that the purpose of the Directive is to establish a framework which:

> *"prevents further deterioration and protects and enhances the status of aquatic ecosystems"*, *"promotes sustainable water use"* and *"aims at enhanced protection and improvement of the aquatic environment* inter alia *through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of priority hazardous substances"*.

Article 4 of the Directive sets out environmental objectives. In relation to surface water, Article 4(1)(a) states that:

i. *"Member States shall implement the necessary measures to prevent the deterioration of the status of all bodies of surface water…*

ii. *Member States shall protect, enhance and restore all bodies of surface water, subject to the application of subparagraph (iii) for artificial and heavily modified bodies of water, with the aim of achieving good surface water status at the latest 15 years after the date of entry into force of this Directive…*

iii. *Member States shall protect, enhance and restore all artificial and heavily modified bodies of water with the aim of achieving good ecological potential and good surface water chemical status at the latest 15 years after the date of entry into force of this Directive…"*

Article 4(1)(b) places the same obligation to prevent deterioration in relation to groundwater and in addition places an obligation to:

> *"protect, enhance and restore all bodies of groundwater, ensure a balance between abstraction and recharge of groundwater, with the aim of achieving good groundwater status at the latest 15 years after the date of entry into force of this Directive…"*

Article 4(7) states that Member States will not be in breach of the Directive when failure to achieve good groundwater status, good ecological status, or good ecological potential as a result of new modifications to the physical characteristics of a surface waterbody/ alterations to the level of a groundwater body, or failure to prevent deterioration from 'high' to 'good' status of a surface waterbody is the result of new sustainable human development activities, provided the following conditions are met:

- all practicable steps are taken to mitigate the adverse impact on the status of the waterbody;
- the reasons for the modifications / alterations are set out and explained in the river basin management plan, the objectives of which are reviewed every six years;
- the reasons for the modifications / alternations are of over-riding public interest and/or the benefits of achieving good status are outweighed by the benefits of the modifications/alterations; and,
- the benefits of the modifications / alternations cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

Article 6 requires:

> *"Member States shall ensure the establishment of a register or registers of all areas lying within each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water. They shall ensure that the register is completed at the latest four years after the date of entry into force of this Directive.*
>
> *The register or registers shall include all bodies of water identified under Article 7(1) and all protected areas covered by Annex IV.*
>
> *For each river basin district, the register or registers of protected areas shall be kept under review and up to date."*

Article 7(1) requires Member States to identify within each river basin:

> *"all bodies of water used for the abstraction of water intended for human consumption providing more than 10m^3 a day as an average or serving more than 50 persons and those bodies of water intended for such future use.*
>
> *Member States shall monitor, in accordance with Annex V, those bodies of water which according to Annex V provide more than 100m^3 a day as an average."*

Annex IV lists the relevant protected areas as:

- *"Areas designated for the abstraction of water intended for human consumption under Article 7;*
- *areas designated for the protection of economically significant aquatic species;*
- *bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC1;*
- *nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC2 and areas designated as sensitive areas under Directive 91/271/EEC3 and*
- *areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including*

[1] The Bathing Water Directive
[2] The Nitrates Directive
[3] The Urban Wastewater Treatment Directive

relevant Natura 2000 sites designated under Directive 92/43/EEC[4] and Directive 79/409/EEC5."

Article 11 requires each Member State to establish a "programme of measures" to achieve the objectives set out in Article 4.

1.2.2 National Policy

The European Communities (Water Policy) Regulations 2003 [2] transposes the WFD into Irish law. It outlines the water protection and water management measures required in EU member states to achieve and maintain at least 'good' status of all water bodies by 2027 and prevent any deterioration in existing water status. The Surface Water Regulations 2009 (S.I. No. 272 of 2009) (as amended) [3] and the Groundwater Regulations 2010 (S.I. No. 9/2010) (as amended) [4] outlines the water protection and water management measures required to maintain high or good status of surface waters and groundwater, respectively, in Ireland. The WFD is implemented through River Basin Management Plans ('RBMPs').

Since 2010, the Government of Ireland has created RBMPs which operate on a renewing six-year cycle. The purpose of these RBMPs is to set targets to address water quality issues, including the protection, improvement and sustainable management of the water environment, in line with the WFD. The first WFD cycle ran from 2009 - 2015, and the second cycle operated from 2016 - 2021. The current (third) cycle runs from 2022 - 2027, and following public consultation, was published in September 2024 under the name "Water Action Plan 2024" [2].

1.3 Assessment Criteria

For the following assessments, the Environmental Protection Agency's ('EPA') Interim Guideline Values ('IGV') [88] are used to assess chemical status in the absence of suitable legislative environmental quality standard ('EQS') limits from the Surface Water Regulations 2009 (S.I. No. 272 of 2009) (as amended) [3] and the Groundwater Regulations 2010 (S.I. No. 9/2010) (as amended).

1.3.1 Surface Water Quality Assessment

Under the WFD [1], surface water bodies are defined as either:

- Rivers;
- Lakes;
- Transitional waters;
- Coastal waters;
- Artificial surface water bodies; and,
- Heavily modified surface water bodies.

The Surface Water Regulations set standards for biological quality elements and physio-chemical conditions, supporting biological elements, which must be complied with. These parameters establish the 'ecological status' of a waterbody. Each natural surface waterbody is assessed on its ecological status and it's supporting physio-chemical and hydromorphological status. Ecological status is assessed based on the following categories, with each category receiving a rating of "High," "Good," "Moderate," "Poor", or "Bad":

[4] The Habitats Directive
[5] The Birds Directive

- Biological quality (aquatic flora and fauna);
- Physico-chemical quality (temperature, oxygenation, pH, nutrient conditions); and,
- Hydromorphological quality (waterflow, sediment composition and movement, riverbank structure etc).

The overall ecological status is based on the lowest of the three individual categories.

In the case of artificial and heavily modified waters, ecological potential status is assessed similarly to the ecological status above but is rated as “Maximum,” “Good,” “Moderate,” “Poor”, or “Bad” ecological potential instead. In general terms, ‘maximum ecological potential’ means that the waterbody is as close as possible to a comparable surface waterbody, with the only differences being those directly attributed to the artificial or modified nature of the waterbody.

Chemical status is given one of two ratings: ‘Good’ or ‘Failing to Achieve Good.’ For an assessment of ‘Good,’ no substance listed in the S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended) (‘SWAC’) [3] may be found in concentrations above the relevant EQS limits.

The overall chemical status of a waterbody is determined by the lowest status found to apply.

1.3.2 Groundwater Quality Assessment

Groundwater is awarded either “Good” or “Poor” status. Groundwater is assessed based on its chemical and quantitative status.

Good chemical status of a groundwater body requires the entry of hazardous substances and saline intrusion into the groundwater to be prevented and the presence of other pollutants to be below the limits within S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended) [4]. Concentrations of pollutants must also not be of such a concentration as to effect the ecological or chemical status of associated surface waters or to damage groundwater dependent terrestrial ecosystems.

Quantitative status is assessed based on whether or not the available groundwater resource is being reduced by the long-term rate of annual abstraction and is rated as “Good” or “Poor.”

2 METHODOLOGY, SCOPE AND POLICY CONTEXT

In order to assist in the implementation of the WFD, EU member states, alongside Norway and the European Commission, developed a "Common Implementation Strategy" ("CIS') in May 2001. This CIS was designed to provide coherent and comprehensible guidelines to achieve the aims of the WFD.

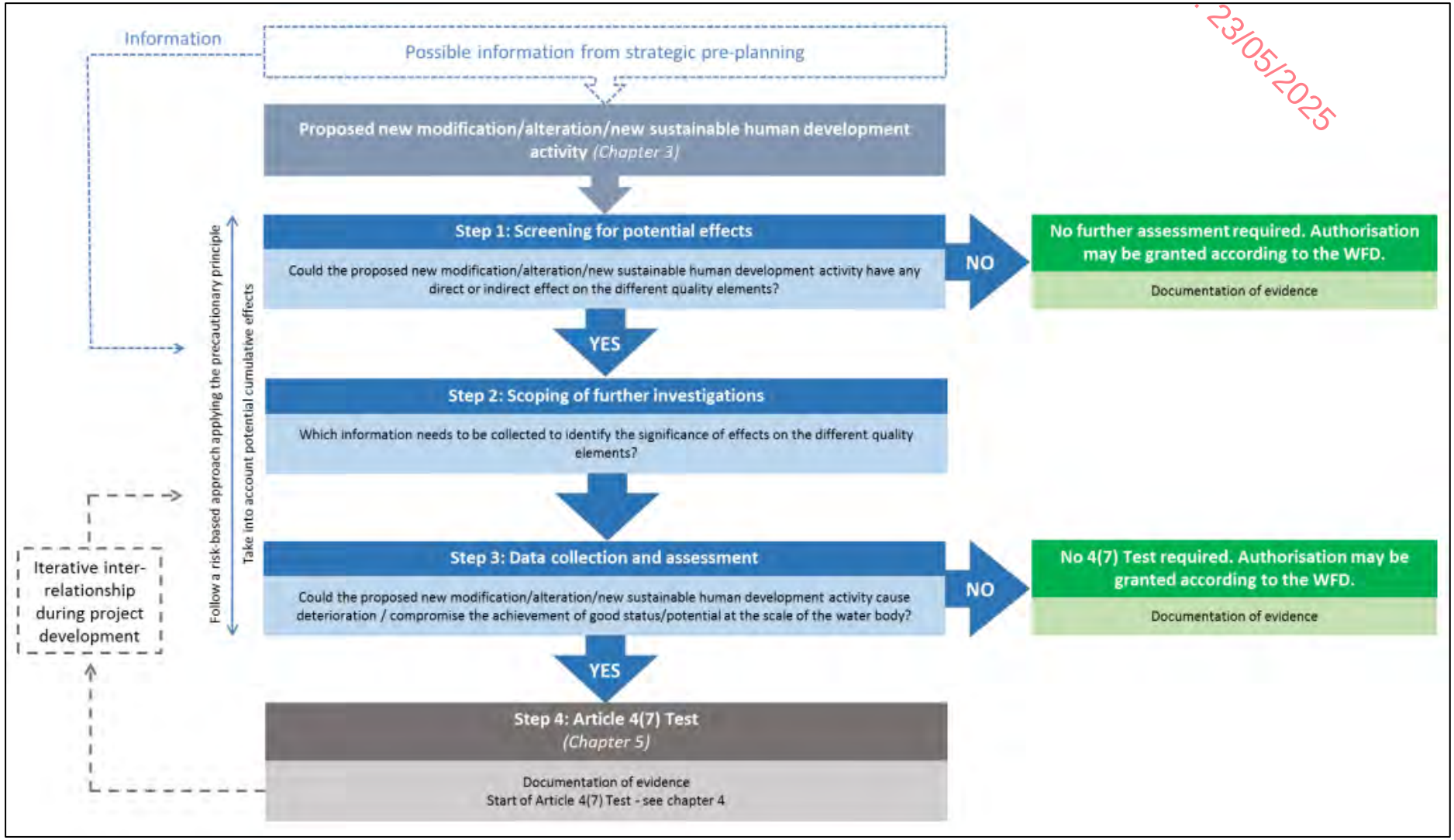
Figure 4 of the CIS Guidance Document 36 – "Exemptions to the Environmental Objectives according to Article 4(7)" [5] provides an outline of an approach to WFD Assessments. This, reproduced in Figure 2-1 below, breaks the assessment down into the following sequential steps:

- Screening for Potential Effects - Determine whether the Project could have any direct or indirect effect on the different quality elements relevant to the WFD;
- Scoping of Further Investigations - Outline the information required to determine the significance of any effect on the relevant quality elements; and,
- Data Collection and Assessment - Assess whether any effect could cause deterioration or compromise the status / potential status of a waterbody.

If the project is determined to compromise or deteriorate the status/potential status of a waterbody then an "Article 4(7) Test" is required. Assessment under Article 4(7) is summarised in CIS Guidance Document 36 [6].

If no effects are identified, then no Article 4(7) assessment is required, and the project may be authorised according to the WFD.

Figure 2-1: WFD Screening Assessment



3 SITE CONTEXT AND STUDY AREA

3.1 Existing Development

The Site is located within the townlands of Glaskill and Agall, Co. Offaly, in a predominately rural and agricultural landscape and is accessed via the L20113, which joins the L2011 local road to the east. The Site entrance is located to the northwest, via the L20113. The Site is situated ca. 6km southwest of Tullamore and ca. 3km northwest of Mucklagh.

Extraction of sand and gravel at the Site date back to operation since ca. 1910 and has been operated by the Applicant since 1985. The current active quarry presents finer sands on the northern face and larger stone and occasional boulders on the southern face.

The current extraction operations at Agall Quarry operate under planning permission granted by An Bord Pleanála in April 2017 (19.QD.0008) for a period of 20 years.

At the time of submitting this planning application, extraction operations are ongoing, and lands permitted for extraction under 19.QD.0008 still remain available for extraction.

3.1.1 Groundwater Monitoring

Groundwater monitoring data is available for the Site since the installation of the 4No. groundwater monitoring wells (MW1A, MW2A, MW3A and MW3B) in August 2017, including monitoring data for PW1.

In addition to this intrusive site investigation, two groundwater monitoring wells (MW4 and MW5) were installed in May 2023, as part of the planning application for the proposed extension of the quarry.

Four groundwater monitoring events have been conducted at the Site since the latter intrusive Site investigations on 27th June 2023 (Q2 2023) and 24th October 2023 (Q4 2023) in accordance with best practice standards (ISO 5667-11:2009).

In addition to the sampling, hydrochemistry monitoring was taken during the sampling of the wells. The laboratory results are presented in Appendix 8-1 and compared with the relevant acceptance criteria within the Groundwater Regulations (S.I. No. 9 of 2010 as amended) ('GAC') [87] and the European Union (Drinking Water) Regulations 2023 (S.I. No. 99 of 2023) ('DWAC') [81]. In the instances where there is no GAC or DWAC available, the IGV were used for comparison. Groundwater monitoring wells MW2A, MW3A and MW5 were noted as being dry during the Q2 and Q4 2023 monitoring events.

No detections of petroleum hydrocarbons (TPH CWG), benzene, toluene, ethylbenzene, and xylene ('BTEX'), as well as methyl tertiary-butyl ether (MTBE), were recorded above laboratory detection limits during historical monitoring or the Q2 and Q4 2023 monitoring events. However, there was one instance of exceeding the IGV limit (0.03mg/l) for orthophosphate as PO_4 at MW3B during the October 2023 monitoring event (0.1mg/l). Additionally, a single detection below the lower GAC and DWAC limit (6.5 units) for pH at PW1 occurred during the October 2023 monitoring event (6.19 units). In terms of historic data, there was one exceedance of the GAC limit (0.065mg/l) for ammoniacal nitrogen as N at PW1 during the June 2021 monitoring event (0.1mg/l).

However, reported concentrations for the remaining analytical parameters (pH, nitrate as NO_3, sulphate, chloride, orthophosphate as PO_4, and ammonia as N/ammonium as NH_4) remained below groundwater and drinking water limits.

3.2 Proposed Development

The Site is located within and extends the Agall Quarry, which covers ca. 45ha. The lands are under the control of the Applicant and lie in the townlands of Glaskill and Agall, Co. Offaly.

The Site is located within a predominately rural and agricultural landscape and is accessed via the L20113, which joins the L2011 local road to the east.

The Site is predominately comprised of areas of agricultural grassland with hedgerows defining field boundaries. To the north a hedgerow/ treelines marks the boundary to residential properties. The Site is bordered to the south by mixed-broadleaved woodland, to the east by the existing operations of the Agall Quarry and restored lands of the Agall Quarry, and to the west by agricultural grassland. The Site incorporates sections of the existing Agall Quarry for access and for further development works (Phase A), along with the continued operation of the fixed screening plant, storage buildings, and welfare.

The Agall Quarry covers an area of ca. 45ha in size. The Site lies within this boundary and covers ca. 17ha, distributed as follows:

- Ca. 11ha for proposed greenfield extension, of which ca. 6.96ha is the proposed extraction area;
- Ca. 3.81ha for proposed extraction within the previously authorised substitute consent lands; and,
- Ca. 2ha. which relates to continued use of the existing onsite infrastructure, including processing plant, wheel wash, site access, office / welfare unit, and continued temporary storage and processing of aggregates.

The Proposed Development will enable the continued extraction of key aggregates from the Agall Quarry to supply the Condron Concrete facility in Tullamore, extending the operational life of the quarry by up to 30 years and is necessitated by the strong economic growth experienced by the Applicant since the current permission was granted at the quarry in 2017.

Water abstraction is from the existing well (PW1) and serves to fill the pre-existing wheel wash and sprinkler system. Low volumes of water are required to operate this system (ca. $3m^3$/day). The volumes of water required will remain unchanged as a result of the Proposed Development. From within the gate the initial portion of the access road is tarmac with a wheel wash and sprinkler system deployed along the route for dust control. Drainage from the road is to the haul road edges where it percolates to ground. The wheel wash is periodically emptied into a secure container onsite, prior to short term storage and removed by competent and authorised contractors. Top-up of the wheel-wash is supplied by the onsite well located along the northern edge of the Agall Quarry.

Adjacent to the pumphouse is the onsite canteen unit for onsite staff, and an office unit. A toilet is located beside the Storage Shed. It discharges to an underground tank which is emptied as required by a licensed contractor and in accordance with the requirements of relevant waste legislation.

No fuel will be stored within the Site. Any oils (and/or lubricants) will be stored in a storage container onsite. Re-fuelling of mobile plant will continue to take place using a fuel truck direct from a fuel merchant when required. Fixed screening plant will be utilised to provide secondary / tertiary processing of aggregate from the Site within the Agall Quarry. This will continue to be refuelled using a fuel truck direct from a fuel merchant when required.

It is important to note that all plant and machinery subject to refuelling procedures will be refuelled by a competent person utilising a drip tray. In addition, absorbent sands and a full spill kit system are stored within the quarry.

3.2.1 Construction Phase

3.2.1.1 Vegetation Clearence and Overburden Stripping

The main extraction will see the Agall Quarry expand to the north and west into new agricultural fields. This will incorporate an area to be stripped of topsoil and subsoils and will expose the underlying aggregates for extraction and processing. Works will include the clearance of hedgerows / treelines at the appropriate time of year.

To remove the soils, a bulldozer or similar will be deployed on the field to strip and push the soils into an embankment along the boundaries. Stripping of new lands will be controlled to expose two phases of extraction at one time to ensure a correct blend of gravels is available.

3.2.1.2 Berm Construction / Landscaping

Two ca. 3m high and 7m wide embankments will be formed to the south and east of the residential landholdings to the north of the new fields. Berms will be developed on a phased basis. As clearance for soil commences in the southern section of Phase B, north of Blackwood, this material will be used to develop the berm north of Phase C, south of the line of residences. Following completion of the berm development, it will be seeded and planted with a double row of native tree species in the first planting season following formation.

The berm to the west of Phase D will be built as clearance works occur in Phase D. This berm will only be in place for the duration of activities within Phase D and will be used during restoration post-development.

A hedgerow and a treeline will be planted between the line of residences and the northern berm. A security fence will be installed between these linear features and the residential housing to the north. Furthermore, ca. 95m of treeline will be planted along the western boundary to provide additional screening to the landholding to the northwest of the Site. This treeline will be planted alongside the existing hedgerow. The security fence along the western boundary will be setback ca.5m from the proposed treeline and will contain two mammal gates.

The Construction Phase will take 3-4 months to complete.

3.2.2 Operational Phase – Aggregate Extraction

The Proposed Development will operate in a similar manner to the current activities at the Agall Quarry. It is estimated that a further 1,770,000m^3 of aggregate is in the operational areas. Extraction itself will be undertaken by use of an excavator, positioned on the pit floor, dragging aggregate down with the bucket. A loading shovel will collect aggregate from the pit floor and transport it to the mobile screening plant. The mobile screening plant will continue to follow the working face, at an operational distance typically 20-100m from the working face. The plant will then move periodically to re-position closer to the working face as it progresses. Fixed plant onsite will be used as required.

Aggregate will be processed into stockpiles of usable fractions by the screening plant, which will be loaded on to trucks as needed, for off-site transportation. Due to the varying aggregate on the pit face, the extraction face will vary depending upon the needs of the Applicant. Additionally, more than one area of pit face may be extracted at any one time to ensure the requisite blend of coarse and fine aggregates.

As part of the project design, a minimum set-back of ca. 80m from the boundaries of the residential homes will be maintained as the extraction area extends.

An additional ca. 2ha of land, within the existing operational pit area, will be utilised for the short-term storage and processing of materials. This area has been included to ensure sufficient space is presented on the Site during the opening of the new phases B, C and D. As

the new lands are extracted, exhausted areas of the Site will be restored and all plant and processing moved forward into the new reserves.

A secondary area for extraction will also be opened within the existing Agall Quarry lands. This ca. 3.81ha area contains viable aggregate reserves, including finer sands and stones. This land is already exposed with soils historically removed.

As no intensification of extraction is proposed within the Site, plant and equipment will be moved from the active face to this area, as and when the aggregates within this location are required. The Operational Phase will occur over 25-28 years.

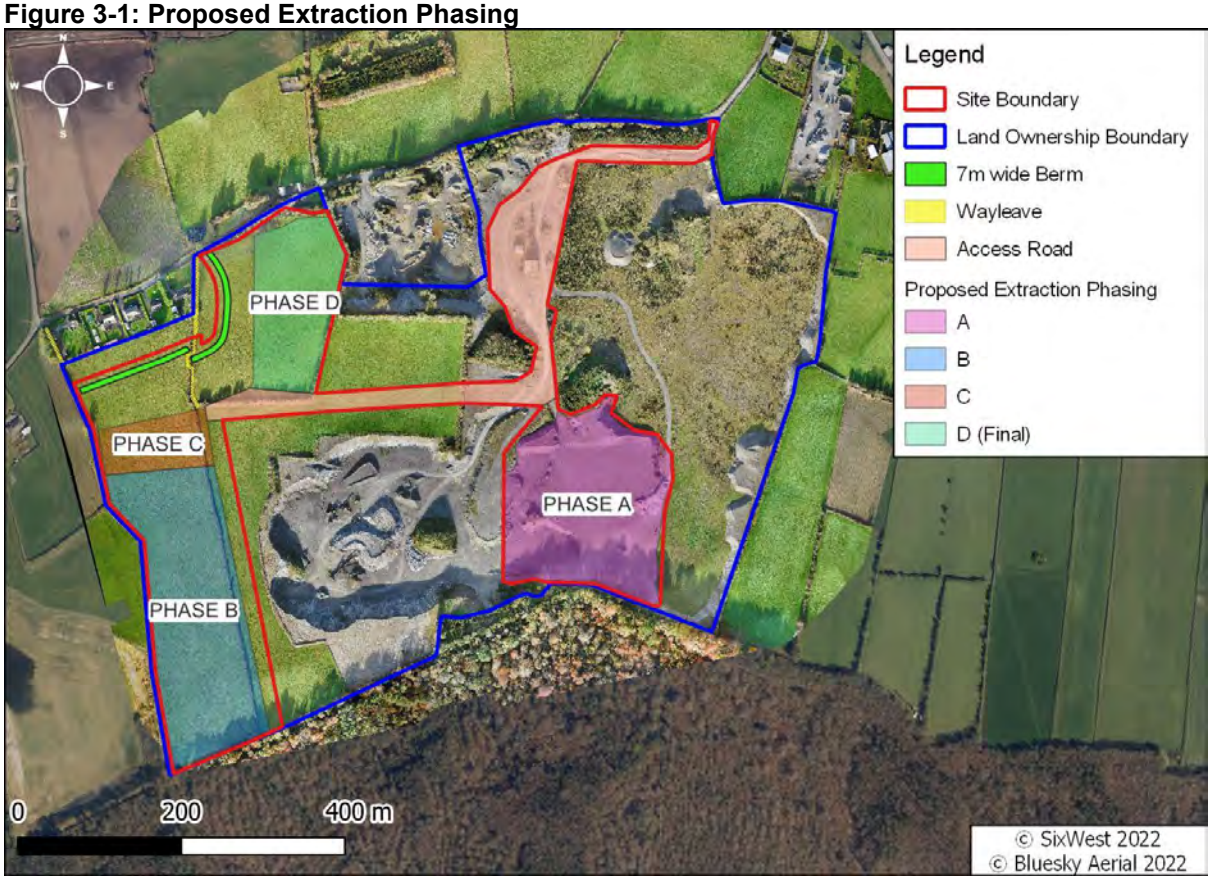
3.2.2.1 Operational Phasing

The extraction area will be cleared, and aggregates removed in a structured manner over time to minimise exposed ground. The future extraction faces will be subject to changes depending upon the available type of aggregate in each section of the Site, and the needs of the Applicant over time. The proposed extraction phasing plan will be carried out alongside the current authorised phasing plan within the Agall Quarry. The extent of the phasing plan and individual phases is shown in Figure 3-1 below and forms the current best knowledge in terms of an approach.

The northern extraction phase (Phase D), approaching the local road will likely be carried out in 20 – 25 years time and this incorporates a sloping topography to the roadside, and setbacks from housing to the west and third-party lands to the east.

The western phase is a similar size to the existing extraction face and mirrors the multiple aggregates that have been identified within this Site by the Applicant.

Figure 3-1: Proposed Extraction Phasing

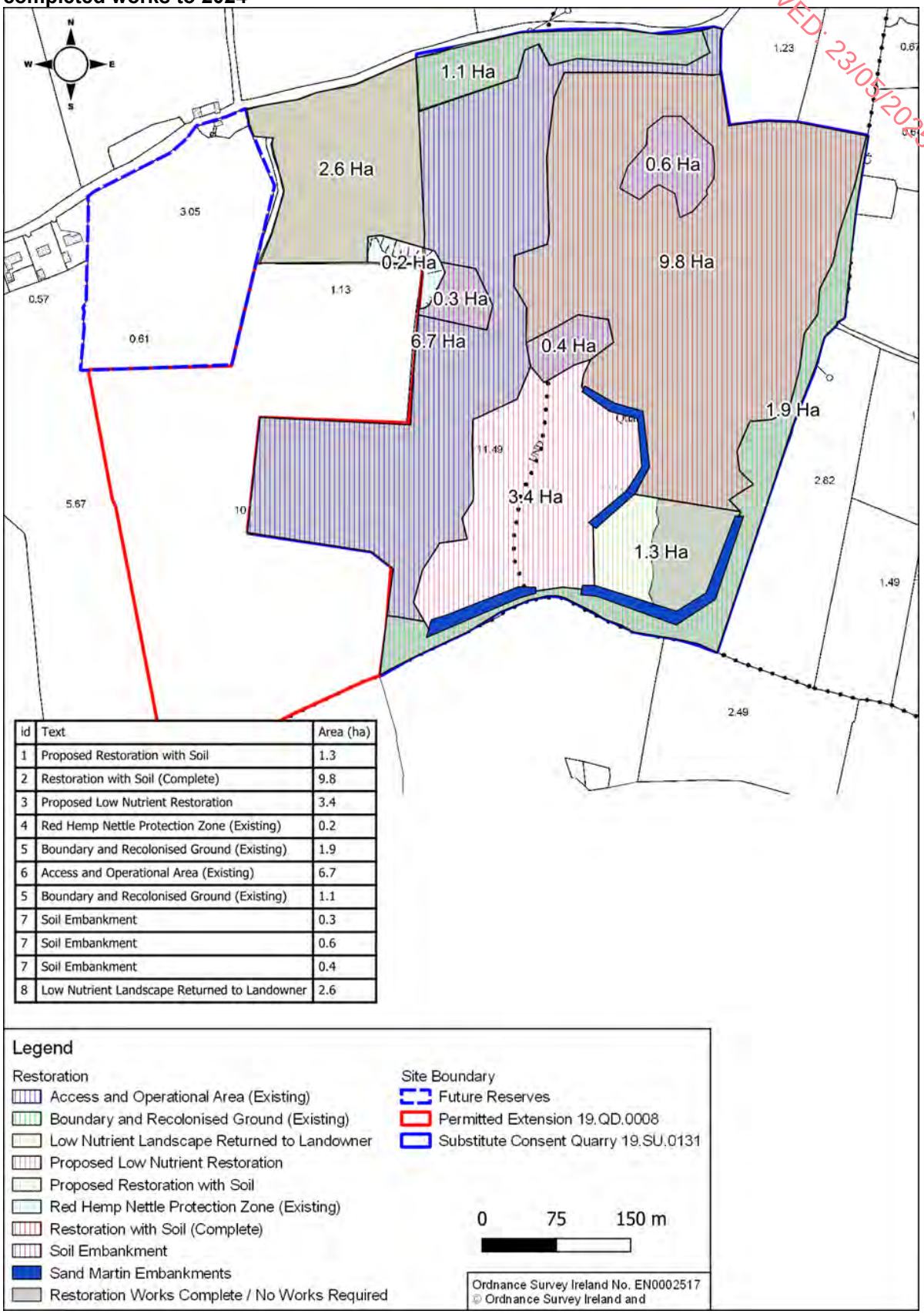


3.2.2.2 Development Phasing

This application for permission to extend and develop the Agall Quary is submitted with a proposed commencement date of 2025. At this time, the existing authorised Agall Quarry will be further advanced within its extraction and will have moved forward with the agreed phased restoration of exhausted sections; refer to Figure 3-2 below. However, it is noted that the full extent of this permission will be still on-going, and aspects of this application will enable this plan to be amended. The amended restoration plan to facilitate the Proposed Development is shown in Figure 3-3 below.

With the commencement of this Proposed Development, the existing extraction strategy will continue, with aggregates being extracted from the authorised area. It is likely, based on the aggregate profiles experienced to date, that the extension of the central face will continue into the new lands, if authorised. Furthermore, the extent of aggregate identified within the eastern portion of the Site for extraction will be removed on an as-needed basis, as this contains finer sands than the main aggregate resource to the west. Therefore, it is likely that if authorised, portions of the Proposed Development will be operating at a time when the existing development is still in operation. The Proposed Development will continue operation after the expiry of the planning permission for the existing extraction activities. The Proposed Development will operate within the permitted outputs under the application to ABP for substitute consent and future works (references: 19.QD.0008) which is currently ca. 200,000 tonnes per annum pending market conditions.

Figure 3-2: Restoration Plan associated with existing planning permission including completed works to 2024



id	Text	Area (ha)
1	Proposed Restoration with Soil	1.3
2	Restoration with Soil (Complete)	9.8
3	Proposed Low Nutrient Restoration	3.4
4	Red Hemp Nettle Protection Zone (Existing)	0.2
5	Boundary and Recolonised Ground (Existing)	1.9
6	Access and Operational Area (Existing)	6.7
5	Boundary and Recolonised Ground (Existing)	1.1
7	Soil Embankment	0.3
7	Soil Embankment	0.6
7	Soil Embankment	0.4
8	Low Nutrient Landscape Returned to Landowner	2.6

3.2.3 Restoration Phase – Site Closure

The Restoration Plan submitted as part of this application supersedes the previous restoration plans for the Agall Quarry submitted under ABP References 19.SU.031 and 19.QD.008. The general plan is shown in Figure 3-3 below.

The restoration of the Site will be a continuous process in line with the previous plans. As such, the proposed restoration will be undertaken in phases as works progress within the Site. The continuous restoration of the Site will involve the following works:

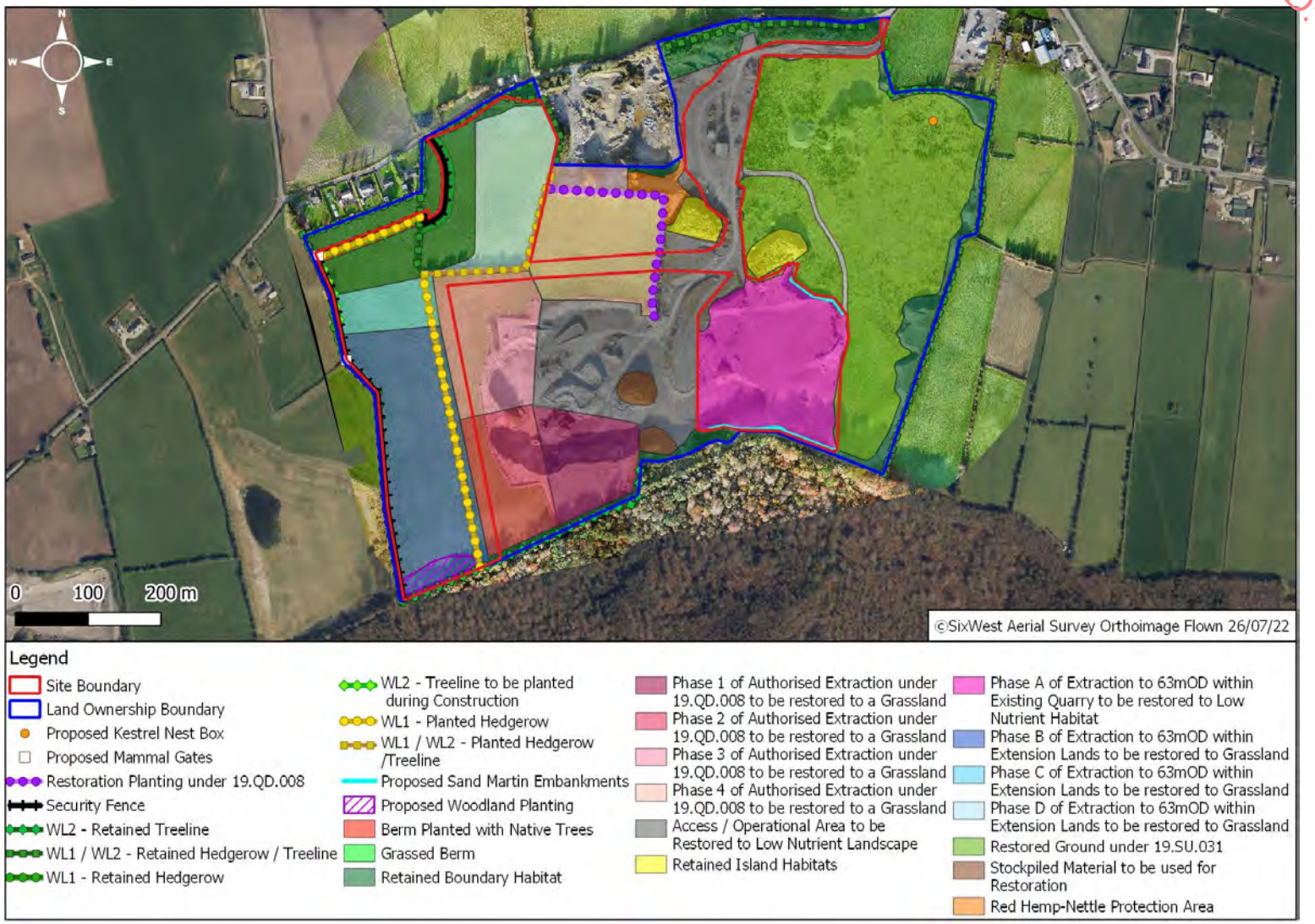
- Extracting aggregate in phases;
- Providing safe slopes from the new ground level to the adjoining lands;
- Spreading soil over exhausted areas within the western portion of the Site with soil removed from the next phase of extraction;
- Re-establishing grasslands and hedgerows within these exhausted areas;
- Introducing a ca. 0.26ha woodland within the southwest portion of the Site once extraction in this area has ceased;
- Establishing a low-nutrient habitat with sand martin embankments within the eastern portion of the Site; and,
- Erecting a kestrel nest box within the northeast portion of the Site.

Upon completion of extraction activities, the Site will be fully decommissioned within a 2-year period, with all plant and equipment removed during the initial stage of final restoration.

Waste considered unsuitable for re-use or recycling, which includes, inter alia, domestic waste, will be disposed of off-site by an appropriately permitted waste contractor at a suitable permitted waste facility. All-access routes will be broken up to improve the percolation of the surface into the ground.

The boundaries of the Site will be checked and security measures in the form of additional perimeter fencing, and signage will be erected as required to prevent unauthorised access to the Site by members of the public.

Figure 3-3: Proposed Restoration Plan



4 STUDY AREA SCREENING

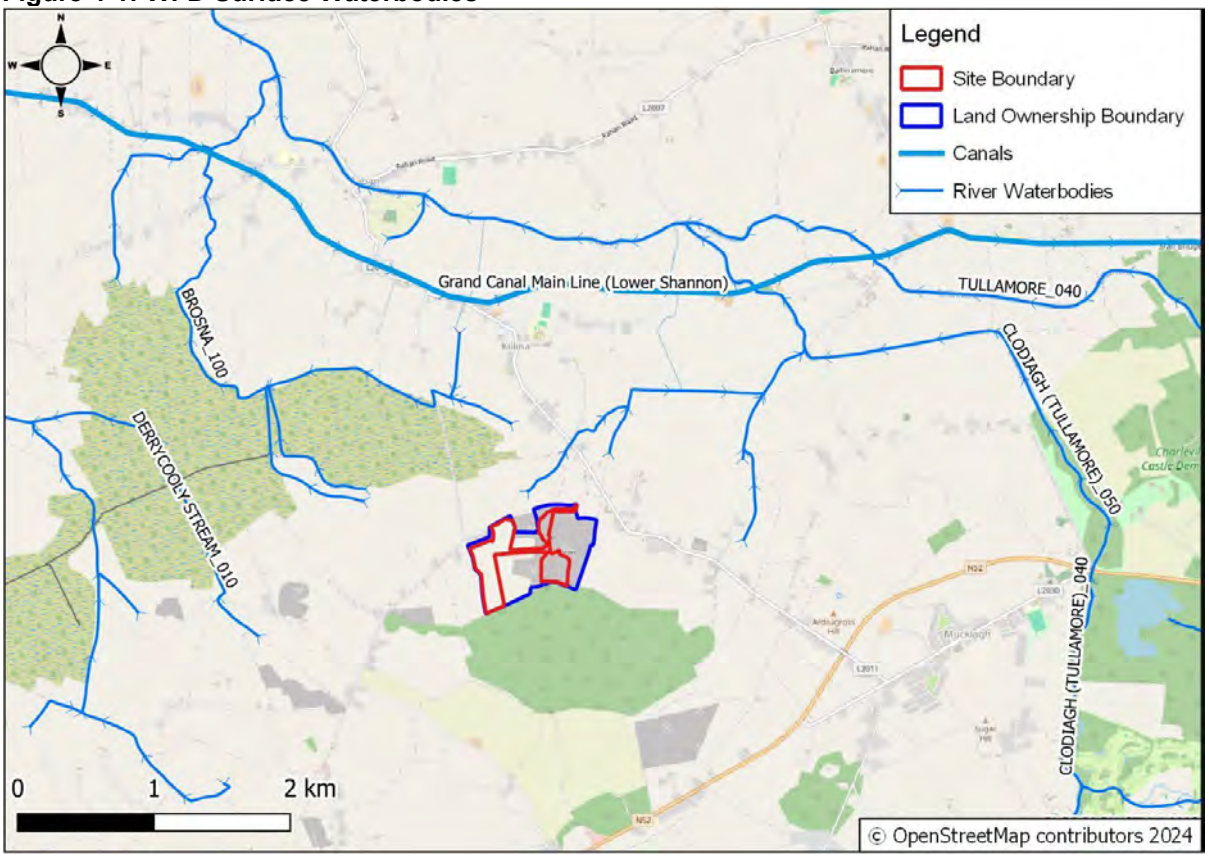
For the purposes of this screening assessment, information available on or through the EPA maps [7] and catchments.ie [8] was utilised throughout.

4.1 Surface Water

According to the EPA Maps , the Site is located within the Lower Shannon Catchment (Catchment ID: 25A), BROSNA_SC_0404 Liffey_SC_090 (subcatchment ID: 25A_5). The CLODIAGH (TULLAMORE)_050 is located ca. 0.24km north of the Site, at its closest point, and it is categorised under the WFD as having "moderate" ecological potential in the most recent 2016-2021 assessment window. It is considered "at risk" of not achieving the quality objectives under the WFD.

The CLODIAGH (TULLAMORE)_050 waterbody flows roughly northeast before crossing beneath the Grand Canal Main Line (Lower Shannon) artificial waterbody via culvert. The CLODIAGH (TULLAMORE)_050 waterbody flows west from this crossing, merging into the BROSNA_100 river waterbody approximately 6km downstream from the Proposed Development.

Figure 4-1: WFD Surface Waterbodies



Details of the nearest waterbody and those connected downstream of it, obtained from catchments.ie [13] datasets, are presented in Table 4-1 below.

Table 4-1: Surface Waterbodies within vicinity of Site

Name	EPA Code	Length (km)	Status (2016 – 2021)			Risk
			Ecological	Physio-Chemical	Hydro-morphological	
River Waterbody						
CLODIAGH (TULLAMORE)_050	IE_SH_25C060500	13.48	Moderate *High confidence*	Failing to achieve good	-	At Risk
BROSNA_100	IE_SH_25B090761	35.81	Moderate *Medium confidence*	Pass	-	At Risk

4.2 Groundwater

Groundwater bodies ('GWB') were screened to a radius of 5km from the Site boundary. Effects from the Proposed Development will unlikely extend beyond this distance, based on professional judgment, given the size and nature of the development compared to the extent of the GWB. Figure 4-2 below shows all the GWBs within 5km of the Site, with details of groundwater bodies presented in Table 4-2 below.

Figure 4-2: Groundwater Bodies

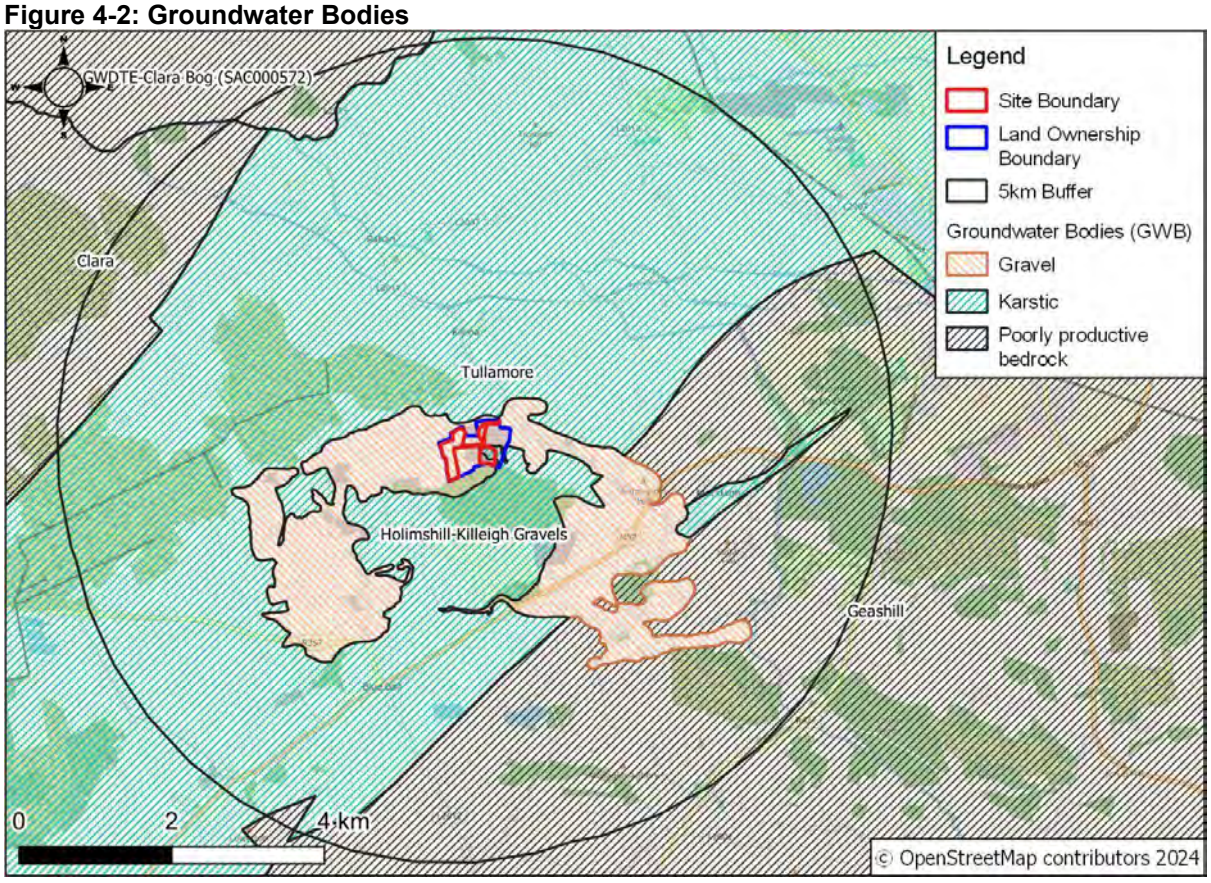


Table 4-2: Groundwater Waterbodies within 5km of Site

Name	EPA Code	Type	Area (km^2)	Status		Risk
				Quantitative	Chemical	
Holimshill-Killeigh Gravels	IE_SH_G_254	Gravels	9.35	Good	Good	Not at Risk
Tullamore	IE_SH_G_232	Karstic	183.91	Good	Good	Not at Risk
Geashill	IE_SH_G_103	Poorly productive bedrock	268.92	Good	Good	Not at Risk
Clara	IE_SH_G_240	Poorly productive bedrock	641.28	Good	Good	Not at Risk

4.3 Protected Sites

4.3.1 European Designated Sites

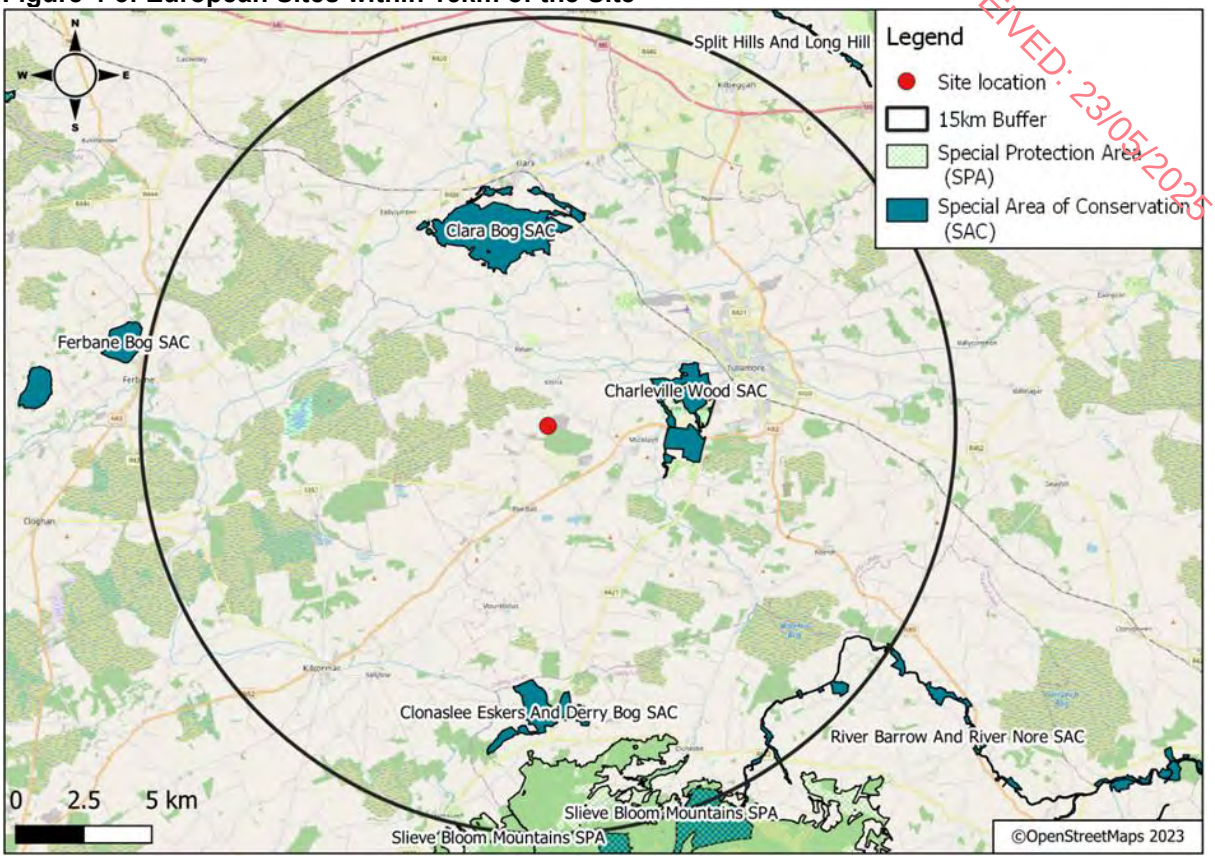
Within 15km of the Site, there are six European Designated Sites, refer to Figure 4-3 below, these include:

- Five Special Areas of Conservation ('SAC') and
- One Special Protection Area ('SPA').

As acknowledged in the Office of Public Works ('OPR') Appropriate Assessment Screening for Development Management guidelines [14], few projects have a zone of influence this large. However, the identification of European sites within 15km has become widely accepted as the starting point for the screening process. Further, any European site lacking a hydrological connection to the Proposed Development will be screened out, as in the absence of any direct impact pathway, the Proposed Development lacks the capacity to affect unconnected European sites.

No direct hydrological connection (i.e. direct discharge into a European site) between the Site and any of the European sites was identified. Effects arising from the Proposed Development will decrease with distance - assessment beyond 15km will not be considered.

Figure 4-3: European Sites within 15km of the Site



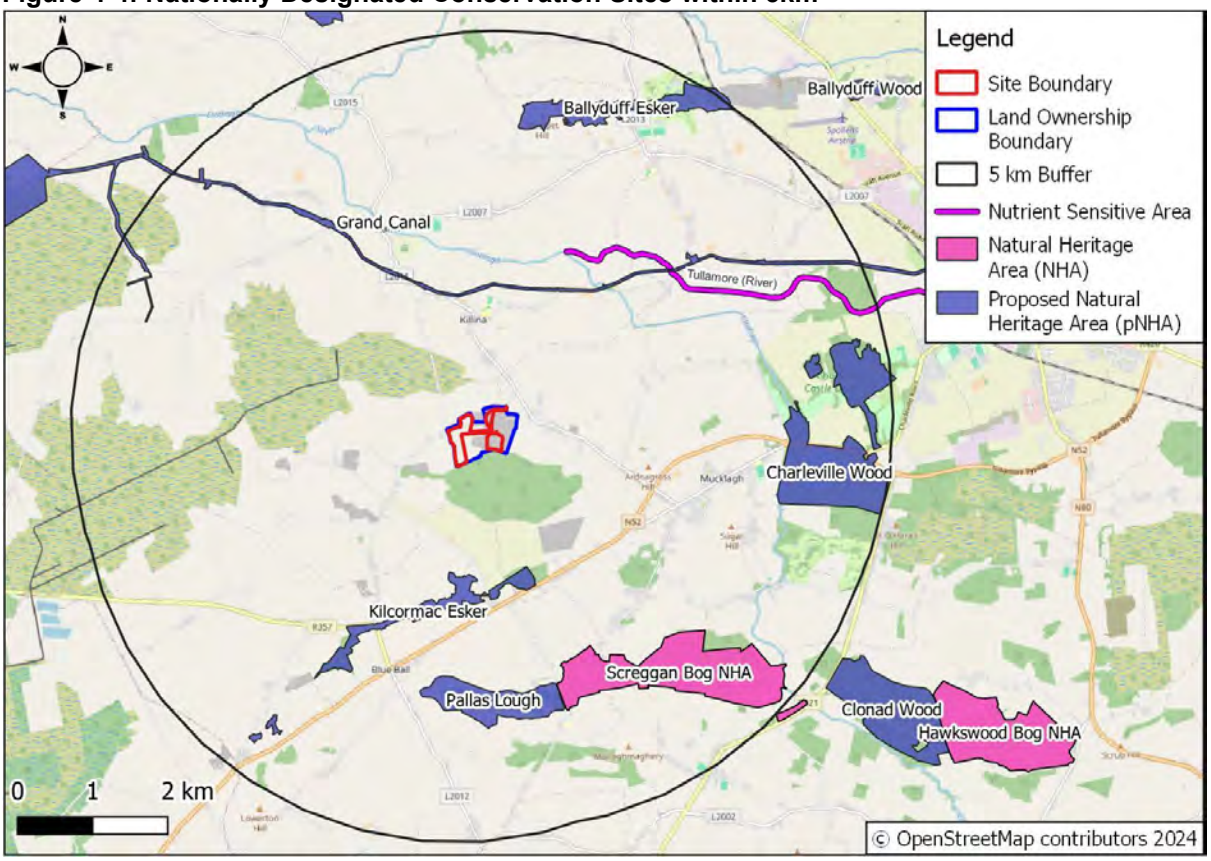
From the direct effects screening criteria above, no indirect hydrological connection to a European site within 15km of the Site was identified either.

4.3.2 Nationally Designated Conservation Sites

The Nutrient Sensitive Areas, Natural Heritage Areas ('NHAs') and proposed Natural Heritage Areas ('pNHAs') within a 5km radius of the Site have been considered. Potential effects arising from the Proposed Development will decrease with distance from the discharge. Therefore, the assessment beyond 5km will not be considered.

One NHA, five pNHAs and one Nutrient-Sensitive Area are located within 5km of the Site, refer to Figure 4-4 below. Any National site lacking a hydrological connection to the Proposed Development will be screened out, as there will be no clear pathway.

Figure 4-4: Nationally Designated Conservation Sites within 5km

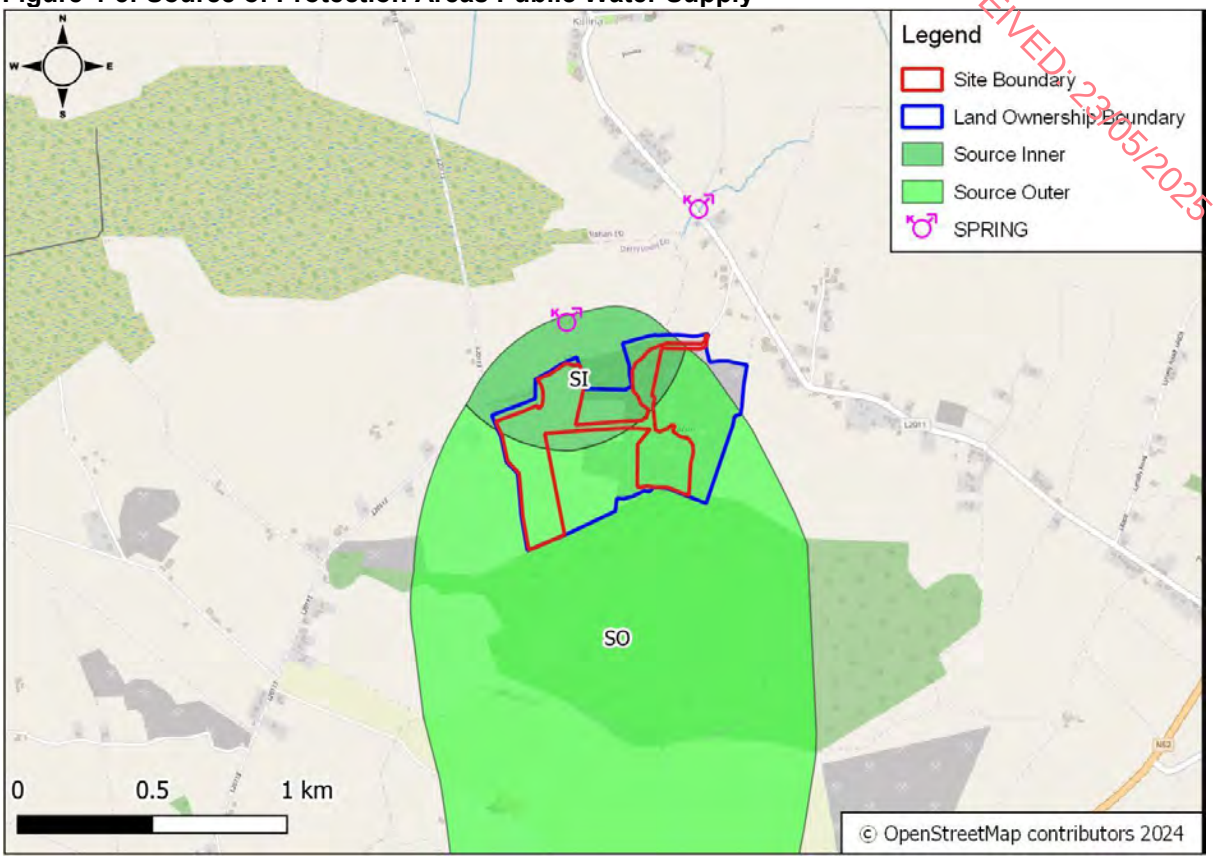


From the location of the nationally designated conservation areas above and the inferred flow of surface waterbodies from Section 4.1 above, no indirect or direct hydrological connection exists between any nationally designated conservation areas and the Proposed Development.

4.4 Groundwater Usage

Source Protection Areas provide a framework for the protection of groundwater used for drinking water supplies and are representative of the geographical area contributing to the abstraction point. The Agall Spring Public Water Supply Source Protection Area is shown in Figure 4-5 below. The northern portion of the Site is within the Source Inner ('SI') protection zone and the southern portion of the Site is within the Source Outer ('SO') protection zone.

Figure 4-5: Source of Protection Areas Public Water Supply



It is noted in the Agall Water Supply Scheme Groundwater Source Protection Zone report [10] that the groundwater flow is northwards, with a relatively flat hydrogeological gradient. Additionally, the report considers the groundwater in the area to be unconfined due to the presence of highly permeable gravels over the limestone aquifer. The report also identifies the potential pollution sources that pose a threat to groundwater in the area, namely;

- Agricultural activities and septic tanks are the principal hazards;
- Machinery at the sand & gravel quarry (the Site) poses a threat to the groundwater from diesel spills, fuel leaks, etc
- Spillage and runoff from roads also pose a threat; and,
- Diesel / oil spills, nitrogen, faecal bacteria and viruses are the main potential pollutants identified.

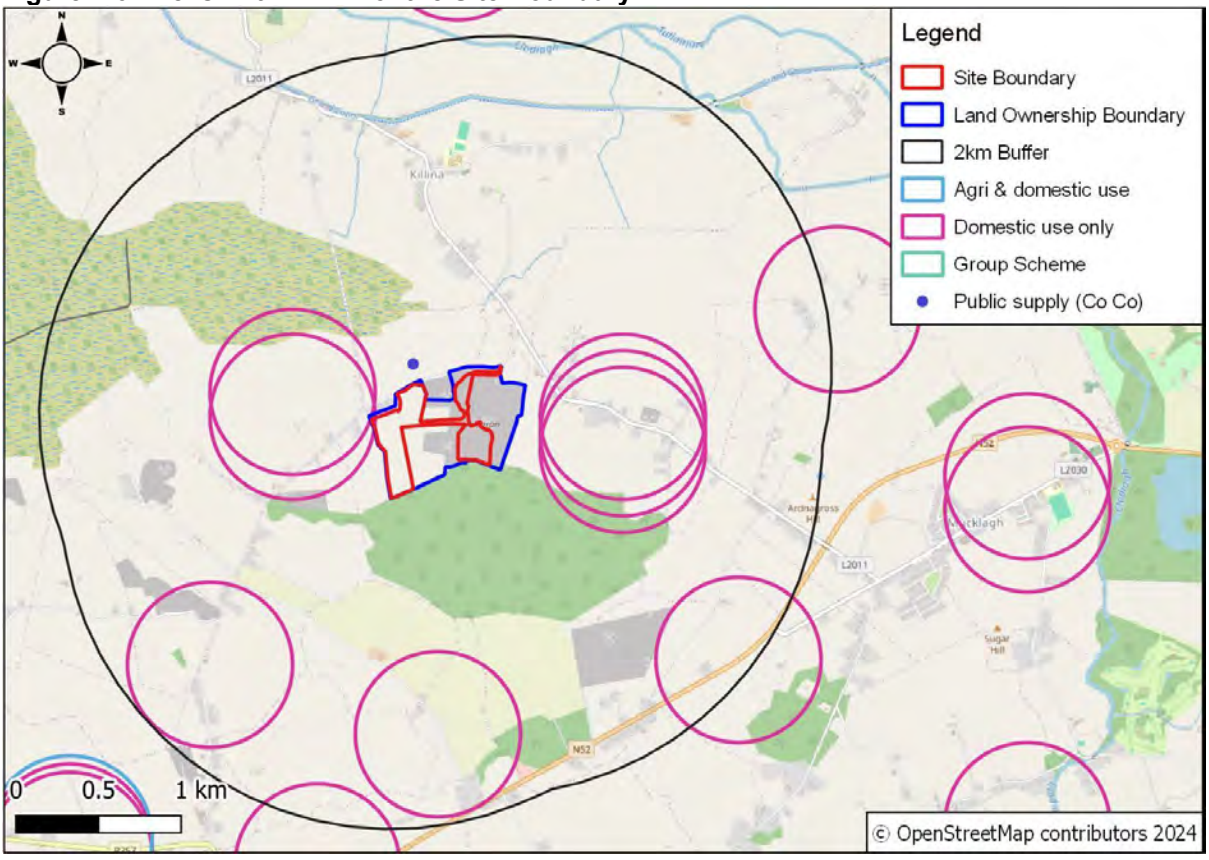
A search of the GSI groundwater well database was conducted to identify registered wells within a 2km radius of the Site. There are 11 wells within 2km of the Site. Refer to Table 4-3 below for details.

Table 4-3: Registered Wells within 2km of Site

Borehole ID	Centre Distance from Site	Grid Reference (Irish Grid)	Well Type	Total Depth (m)	Townland	Yield (m^3d)
2021NEW004	0.13km N	223320 226730	Spring	-	Agall	1090
2021NEW019	0.47km W	223000 226000	Dug well	12.2	Roscore	19.6
2021NEW021	0.48km NW	223150 226000	Borehole	12.8	Roscore	21.8
2021NEW023	0.61km E	223000 228000	Borehole	29.9	Glaskill	16.4
2021NEW022	0.62km E	222900 228000	Borehole	24.5	Glaskill	4.4
2021NEW024	0.65km E	222800 228000	Borehole	43.9	Glaskill	Not recorded
2021NEW009	1.46km S	221080 226880	Dug well	4.9	Brackagh	27.3
2021NEW015	1.49km SW	221500 225500	Borehole	61	Glasshouse	13.1
2021NEW010	1.84km SE	221530 228700	Dug well	14	Heath	21.8
2021NEW025	1.94km SE	223650 229300	Borehole	16.4	Lynally Glebe	28
2021NEW039	2.27km S	220280 226150	Borehole	18.9	Lugglass	21.8

These wells and any other abstraction points downgradient of the Site are the secondary receptors for contamination under any Source-Pathway-Receptor linkages in relation to groundwater, with groundwater flow in the bedrock aquifer acting as a pathway to these receptors. Only Public Supply well 2021NEW004 is downgradient of the Site and as such the remaining wells are screened out.

Figure 4-6: Wells Within 2km of the Site Boundary



4.5 Water Pressures

The EPA has identified significant pressures for waterbodies that are "At Risk" of not meeting their water quality objectives under the WFD. Significant pressures are those pressures which need to be addressed in order to improve water quality. From the data presented on the EPA maps [10], there are water pressures within 5km of the Site for surface waters which are summarised in Table 4-4 and Table 4-5 below.

Table 4-4: EPA Water Pressures on Surface Waterbodies 5km from Site

Pressure/Waterbody	Abstraction	Agricultural	Extractive Industry	Hydromorphology	Urban Run-off
CLODIAGH (TULLAMORE)_050	✓	-	-	✓	-
BROSNA_100	-	✓	-	-	-

Table 4-5: EPA Water Pressures on Groundwater Waterbodies 5km from Site

Pressure / Waterbody	Agricultural	Extractive Industry
Tullamore	✓	✓
Clara	-	✓
Holimshill-Killeigh Gravels	-	-
Geashill	-	-

Based on EPA maps, there are no facilities within 5km of the Proposed Development which hold any EPA-issued licenses.

4.6 Final Screening

Given the pressures and hydrological connectivity of the waterbodies discussed above, waterbodies can be categorised into either requiring further assessment or not requiring further assessment; see Table 4-6 below.

The river waterbodies identified in Section 4.1 are not considered as having connectivity with the Proposed Development as there is no proposed discharges to surface water as part of the Proposed Development, and therefore these have been screened out of further assessment – Refer to Section 5. No protected sites were identified as having any hydrological connection to the Proposed Development within the relevant screening distances and as such, protected sites were screened out in preliminary screening before this final stage.

Note:

An overall quality status for waterbodies is assigned by the EPA based on a combination of the statuses shown in Tables 4-1 and 4-2 above. To remain consistent with the most recent data presented by the EPA, the overall quality status presented below is taken from the 2016-2021 quality status assigned to each waterbody on the EPA maps web viewer [12].

Table 4-6: Screening Table

Name	Quality Status (Overall)	Risk	Further Assessment?	Justification
River Waterbody				
CLODIAGH (TULLAMORE)_050	Moderate	At Risk	No	There is no hydrological connection between the Site and this waterbody.
BROSNA_100	Moderate	At Risk	No	There is no hydrological connection between the Site and this waterbody.
Groundwater Waterbody				
Holimshill-Killeigh Gravels	Good	Not At Risk	Yes	This GWB directly underlies the majority of the Site. Given that the Proposed Development represents an area of ca. 1.93% of the GWB and the Proposed Development activities will result in the removal of gravels/aggregate and pathways to groundwater, further consideration will be given to this GWB.
Tullamore	Good	Not At Risk	Yes	The Site represents only a small area (<0.1%) relative to the total area of the aquifer. However, there is a number of identified water pressures for this waterbody, including extractive industry. Additionally, the Holimshill-Killeigh gravels are deposits overlying the Tullamore bedrock aquifer, acting as a vertical buffer between the Site and the bedrock. As the Proposed Development intends to extract below the existing quarry depth this will reduce this buffer and as such, further consideration will be given to this GWB.
Geashill	Good	Not At Risk	No	The good quality status, the “not at risk” status, lack of direct hydrological connection or no identified water pressures for this waterbody.
Clara	Good	Not At Risk	No	The good quality status, the “not at risk” status or lack of direct hydrological connection.

5 IMPACT ASSESSMENT

The impact assessment, following the screening in Table 4-6 above, is only considered in relation to groundwater pathways. These are presented in Section 5.1 below.

5.1 Groundwater Bodies

The screening assessment identified two groundwater bodies for further evaluation.

- Holimshill-Killeigh Gravels GWB; and,
- Tullamore GWB.

These GWBs are discussed specifically in sections 5.1.1 and 5.1.2 below.

5.1.1 Holimshill-Killeigh Gravels

The further assessment of the Holimshill-Killeigh Gravels GWB is outlined in Table 5-1 below.

Table 5-1: Holimshill-Killeigh Gravels GWB

Receptor	Potential Effect from Site	Potential Effect of Proposed Development	Mitigation Required?
Quantitative quality	No	There are no changes to current abstraction of groundwater planned as part of the construction or operational phase of the Proposed Development. As such, no quantitative effects are predicted.	No
Chemical quality	Yes	The use of onsite machinery within the quarry presents a hazard to underlying GWB chemical quality, primarily from the fuels and hydrocarbon oils utilised by machinery during quarry operations. A spill or release of hydrocarbons onsite could potentially result in a negative effect to the chemical quality of GWB. The risk for such an event to occur would remain until the completion of restoration/infilling onsite. As such, mitigation will be required to reduce the risk of such a spill or release from occurring to an acceptable level. Additionally, mitigation will be implemented to provide measures that will limit the magnitudes of any impacts should such a spill or release occur.	Yes

5.1.2 Tullamore

The further assessment of the Tullamore GWB is outlined in Table 5-2 below.

Table 5-2: Tullamore GWB

Receptor	Potential Effect from Site	Potential Effect of Proposed Development	Mitigation Required?
Quantitative quality	No	There are no changes to current abstraction of groundwater planned as part of the construction or operational phase of the Proposed Development. As such, no quantitative effects are predicted.	No
Chemical quality	Yes	The use of onsite machinery within the quarry presents a hazard to underlying GWB chemical quality, primarily from the fuels and hydrocarbon oils utilised by machinery during quarry operations. A spill or release of hydrocarbons onsite could potentially result in a negative effect to the chemical quality of GWB. The risk for such an event to occur would remain until the completion of restoration/infilling onsite. As such, mitigation will be required to reduce the risk of such a spill or release from occurring to an acceptable level. Additionally, mitigation will be implemented to provide measures that will limit the magnitudes of any impacts should such a spill or release occur.	Yes

5.2 Mitigation Measures

The potential impacts identified in waterbodies screened into the impact assessment are predominantly associated with operational activities as part of the Proposed Development. The potential impact sources identified were;

- Hydrocarbons (lubricants or vehicle engine) spills to groundwater or oil/fuel spill during refuelling operations, causing significant damage to the aquatic environment.

Mitigation to reduce the potential impact to an acceptable level is described below;

- All quarry vehicles will be refuelled via dedicated refuelling bowser with adequate spill protection measures employed;
- Spill kits will be available adjacent to all refuelling operations;
- Items of plant will be refuelled utilising adequately sized and positioned drip trays;
- The wheel wash will be serviced and maintained, including the removal of sediment offsite periodically by a permitted contractor to a licensed facility, to prevent the release of finer sediment, fuels and greases that accumulate over time;
- Unauthorised access is prevented; and,
- Any hazardous waste, such as waste oils, generated onsite will be collected in leak-proof containers and stored onsite in designated areas to be collected and recycled/ disposed of by an authorised waste contractor.

In addition, the following measures will be implemented to prevent contamination release:

- Preventative maintenance and relevant maintenance logs will be kept for all onsite plant and equipment;
- Procedures and contingency plans will be implemented to deal with emergency accidents or spills;
- Lubricants and hydraulic fluids for screening equipment used on the Site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best practice codes; and,
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the Site and properly disposed of.

6 CONCLUSIONS

The Proposed Development has the potential to effect two waterbodies:

- The Holimshill-Killeigh Gravels GWB ("Good" WFD quality status); and,
- The Tullamore GWB ("Good" WFD quality status).

Both the Holimshill-Killeigh Gravels GWB and Tullamore GWB risk status is 'not at risk'.

Without mitigation, it was predicted that the Proposed Development could have a negative effect on the above waterbodies, specifically should an unplanned spill or release of hydrocarbons occur. Mitigation measures are proposed for the Proposed Development to manage the risk of such an event from occurring and to limit any effects arising from such an event. With mitigation, these effects, will be imperceptible, localised and without an effect on the overall quality status of the waterbodies.

There were no protected sites which were identified as hydrologically connected to the Site and as such no effects were predicted for protected sites.

As such, it can be concluded that the Proposed Development will not:

- Jeopardise the achievement of:
    - good quality status;
    - good chemical status; or,
    - good ecological potential

  for any directly or indirectly connected groundwater body or surface waterbody;
- Contribute to the risk of any directly or indirectly connected waterbody from failing to achieve "Good" status within the next cycle of the Water Framework Directive monitoring; and,
- Degrade the ecological quality of the protected sites associated with connected waterbodies nor jeopardise the goals and/or targets set out for these protected sites.

Therefore, the Proposed Development will not compromise the objectives and requirements of the WFD within the local area and within the river basin district or the ability of any waters to meet the objectives of the WFD and transposing legislation.

7 REFERENCES

[1] European Commission, "Water Framework Directive," European Commission, 2000.

[2] Government of Ireland, "S.I. No. 722/2003 - European Communities (Water Policy) Regulations 2003," House of the Oireachtas, Dublin, 2003.

[3] Government of Ireland, "S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009," Houses of the Oireachtas, Dublin, 2009.

[4] Governement of Ireland, "European Communities Environmental Objectives (Groundwater) Regulations 2010," House of Oireachtas, Dublin, 2010.

[5] Government of Ireland, "Water Action Plan 2024," GoI, Dublin, 2024.

[6] EPA, "Towards Setting Guideline Values for the Protection of Groundwater in Ireland - Interim Report," EPA, 2003.

[7] M. Raimund, "Exemptions to the Environmental Objectives according to Article 4(7)," 2017.

[8] Common Implementation Strategy, "Guidance Documnet 36 - Exemptions to the Environmental Objectives According to Article 4(7)," Common Implementation Strategy, 2017.

[9] Government of Ireland, "S.I. No. 122/2014 - European Union (Drinking Water) Regulations," Houses of the Oireachtas, Dublin, 2014.

[10] EPA, "EPA Map Viewer," 2024. [Online]. Available: http://gis.epa.ie/Envision.

[11] EPA , "Catchments.ie," [Online]. Available: https://www.catchments.ie/. [Accessed 2024].

[12] OPR, "Appropriate Assessment Screening for Development Management," 2021.

[13] Geological Survey of Ireland / Offally County Council, "Agall Water Supply Scheme - Groundwater Source Protection Zones," 2001.

APPENDIX 9

APPENDIX 9-1

Glossary of Acoustic Terminology

Abbreviation / Description Descriptor	
A Weighted	A time weighting given to noise values to amend the values to suit the human ear response to the various frequency components of the sound.
Acoustic environment	Sound from all sound sources as modified by the environment (BS ISO 12913-1:2013).
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. *Note: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, L_a = $L_{Aeq,\,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T. *Note: the ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound level, $L_{A90,\,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
dB (decibel)	A relative unit of measurements, based on a logarithmic scale to describe the ratio between the measured level and a reference or threshold level of 0dB. Unless otherwise stated 0dB within this report is $2x10^{-5}$ pascals (Pa).
Day	A 24 hour period from midnight to midnight.
Daytime	A 12 hour period between 07:00 – 19:00 hours, as per NG4
Evening-Time	A 4 hour period between 19:00 – 23:00 hours, as per NG4
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,\,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T=t_2-t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given the following equation: $L_{AeqT} = 10\lg_{10}\left\{(1/T)\int_{t_1}^{t_2}[p_A(t)^2/p_0^2]dt\right\}$ where: p_0 is the reference sound pressure (20 μPa); and $p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t *Note: The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.*
$L_{AN,T}$	The Fast interval, A-Weighted noise level in the for the 'N' percentile of the sampling interval 'T'.
$L_{A10,T}$	The A-Weighted noise level for the 10%ile of the sampling interval 'T', typically utilised to represent peak noise events such as intermittent passing traffic.
$L_{A90,T}$	The A-Weighted noise level in the lower 90 percentile of the sampling interval 'T', excludes intermittent features typical of traffic. See also background sound level.
$L_{A95,T}$	The A-Weighted noise level for the 95%ile of the sampling interval 'T'. Representative of steady noise events at a monitoring location.

$L_{Aeq,T}$	The equivalent continuous sound level, used to describe the fluctuating noise in terms of a single noise level over the same sampling time period (T). Also see ambient sound.
L_{den}	Day-evening-night equivalent level, calculated as: $Lden = 10Log\frac{1}{24}\left(12*10^{\frac{Lday}{10}}+4*10^{\frac{Levening+5}{10}}+8*10^{\frac{Lnight+10}{10}}\right)$ Where the L_{day}, $L_{evening}$ and L_{night} are as defined in ISO1996-2:1987, and for the duration of 12 hours, 4 hours and 8 hours respectively, are A-weighted long term Leq sound level.
L_{day}	Day equivalent level. A-weighted Leq sound level measured over the 12 hour period from 07:00 hours to 19:00 hours.
$L_{evening}$	Evening equivalent level. A-weighted Leq sound level measured during the evening period of 19:00 hours to 23:00 hours.
L_{Amax}	The maximum RMS A-Weighted sound pressure level occurring within a specified time period.
L_{night}	Night equivalent level. A-weighted Leq sound level measured during the night period of 23:00 hours to 07:00 hours.
Measurement time interval, T_m	total time over which measurements are taken. *Note: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Rating level, $L_{Ar,\,Tr}$	specific sound level plus any adjustment for the characteristic features of the sound.
Reference time interval, T_r	specified interval over which the specific sound level is determined. *Note: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h*
Residual sound	ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, L_r = $L_{Aeq,T}$	equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Specific sound level, L_s = $L_{Aeq,Tr}$	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific sound source	sound source being assessed.
Night-Time	An 8 hour period between 23:00 – 07:00 hours, as per NG4
Noise Ambient	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. Also see ambient sound.
Noise Background	The steady existing noise level present without contribution from any intermittent sources, The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, 'T' ($L_{AF90,T}$). Also see background sound level, $L_{A90,\,T}$.
Noise Specific	The sound arising from the source under investigation, disregarding all external and residual sources. Also see specific sound source.
NSR	Noise Sensitive Receptor - an identified dwelling, amenity area, recreational zone or other such place where a change in noise may result in a nuisance impact.
RMS	Root Mean Squared, mathematical method to account for swells and troughs within wave forms, such as sound.

Sound Power Level (L_W)	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m2. Utilised to express the intensity at source of a noise emission.
Sound Pressure Level (L_P)	Fluctuations in air pressure caused by the passage of a sound wave. The measurement of sound/noise through the use of a sound level meter, is a representation of these fluctuations in air pressure as they pass the instrument microphone.
Time Weighting	One of the averaging time for noise monitoring instrumentation: F – Fast, instrument samples every 125 milliseconds; S – Slow, instrument samples every 1 second; I – Impulsive, instrument samples every 35 milliseconds.

Note:

Unless otherwise stated all broadband noise values are A-weighted with a fast response.

Where 0dB is referenced it refers to the threshold of hearing – $2x10^{-5}$Pa.

All 1/3 octave values are unweighted/linear. (z-weighted on the Bruel and Kjaer software)

APPENDIX 9-2-1

E2018
Sources and Receivers

Model: Final 45m April 2024
Final version - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - LimA - ISO 9613

Name	Desc.	ISO H	ISO Terr.	HDef.	Weighting	Flow(D)	Flow(E)	Flow(N)	Avg.speed	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k
Out	Lorry Out	0.75	--	Relative	A	12	--	--	10	74.80	89.90	97.40	102.80	102.00	102.20	97.00
In	Lorry in	0.75	--	Relative	A	12	--	--	10	74.80	89.90	97.40	102.80	102.00	102.20	97.00
Shovel	C.6.36 Wheeled loader	0.75	66.00	Relative	A	12	--	--	10	93.80	95.90	102.40	101.80	104.00	103.20	100.00

Model: Final 45m April 2024
Final version - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - LimA - ISO 9613

Name	Lw 8k	Red 63	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
Out	92.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
In	92.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shovel	88.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Model: Final 45m April 2024
Final version - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz	DI_Vert	DI(0)	DI(10)	DI(20)	DI(30)	DI(40)	DI(50)	DI(60)	DI(70)
Excavator	C.2.02	1.00	66.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
screen	C.10.14 Semi mobile screen	2.00	66.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Model: Final 45m April 2024
Final version - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	DI(80)	DI(90)	DI(100)	DI(110)	DI(120)	DI(130)	DI(140)	DI(150)	DI(160)	DI(170)	DI(180)	Ca(D)	Ca(E)	Ca(N)	Weighting	No refl.	No building	No ind.site
Excavator	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.78	--	--	A	No	No	No
screen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No	No

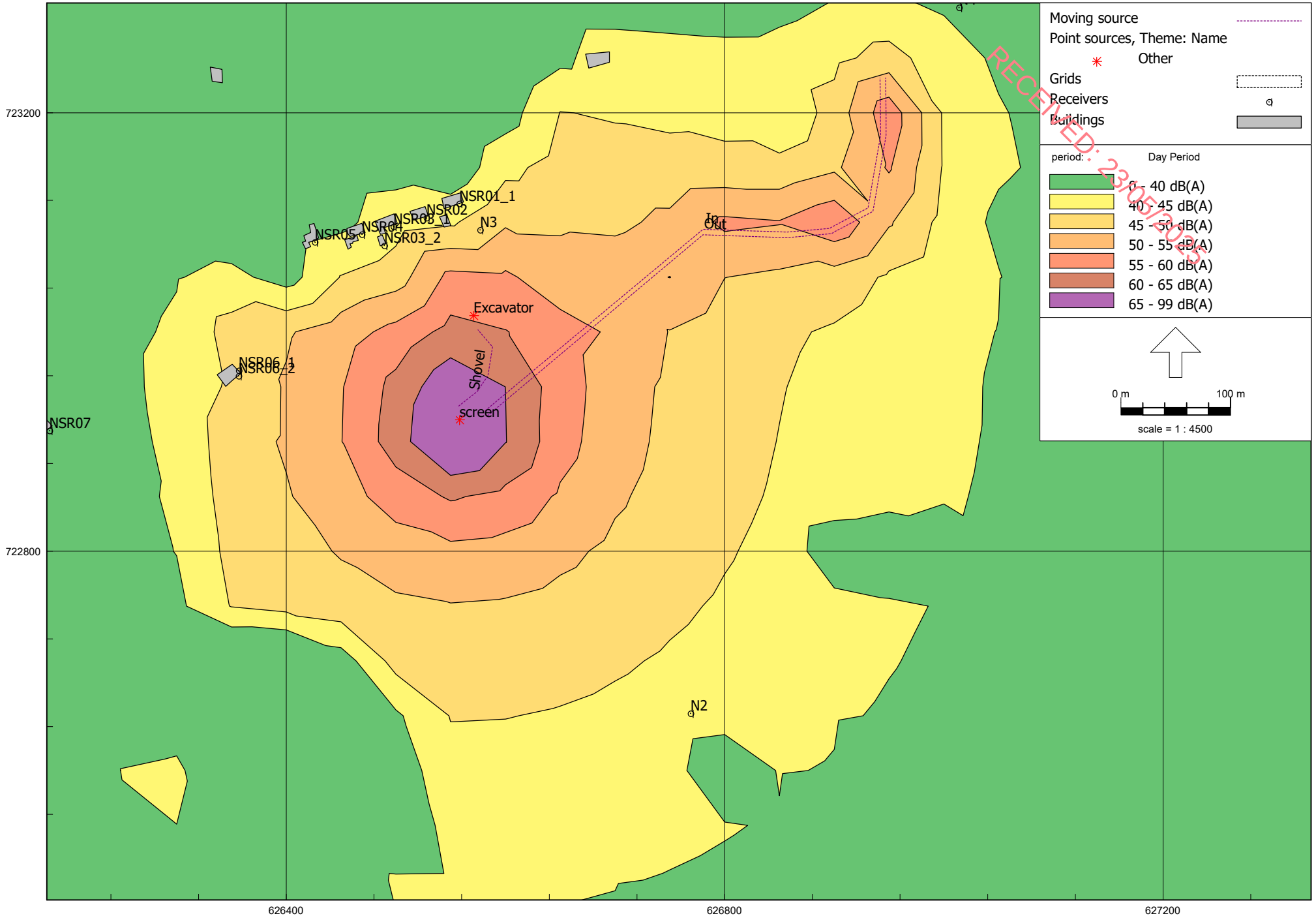
Model: Final 45m April 2024
Final version - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 63	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
Excavator	76.80	95.90	97.40	98.80	98.00	97.20	93.00	87.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
screen	94.80	97.90	98.40	102.80	103.00	100.20	98.00	88.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Model: Final 45m April 2024
Final version - Area
Group: (main group)
Listing of: Receivers, for method Industrial noise - LimA - ISO 9613

Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F
N1	Noise Monitoring Location 1	67.15	Relative	2.00	--	--	--	--	--
N2	Noise Monitoring Location 2	66.00	Relative	2.00	--	--	--	--	--
N3	Noise Monitoring Location 3	74.98	Relative	2.00	--	--	--	--	--
N4	Noise Monitoring Location 4	66.00	Relative	2.00	--	--	--	--	--
NSR01_1	Bungalo NSR01	74.24	Relative	1.50	--	--	--	--	--
NSR02	Bungalo for NSR02	74.40	Relative	1.50	--	--	--	--	--
NSR03_1	Bungalo for NSR03	74.24	Relative	1.50	--	--	--	--	--
NSR03_2	Small house with windows outside NSR03	74.44	Relative	1.50	--	--	--	--	--
NSR04	Bungalo NSR04	72.97	Relative	1.50	--	--	--	--	--
NSR05	Bungalo NSR05	71.61	Relative	1.50	--	--	--	--	--
NSR06_1	Bungalo NSR06	71.16	Relative	1.50	--	--	--	--	--
NSR07	Bungalo NSR07	64.51	Relative	1.50	--	--	--	--	--
NSR08	Bungalo NSR08	65.43	Relative	1.50	--	--	--	--	--
NSR10		60.28	Relative	1.50	4.00	--	--	--	--
NSR09		65.91	Relative	1.50	4.00	--	--	--	--
NSR06_2		71.37	Relative	1.50	4.00	--	--	--	--

APPENDIX 9-2-2



Final 45m April 2024
17 Apr 2024, 09:14

Malone O'Regan Environmental Services Ltd, Ireland

LimA - ISO 9613, [Final version - Final 45m April 2024] , Predictor V2024 Licensed to Malone O'Regan Environmental Services Ltd, Ireland

APPENDIX 9-2-3

Report: Table of Results
Model: Final 45m April 2024
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	X	Y	Height	Day
N1_A	Noise Monitoring Location 1	627286.00	723091.00	2.00	33.1
N2_A	Noise Monitoring Location 2	626769.00	722652.00	2.00	42.6
N3_A	Noise Monitoring Location 3	626577.00	723093.00	2.00	41.3
N4_A	Noise Monitoring Location 4	627014.00	723296.00	2.00	38.6
NSR01_1_A	Bungalo NSR01	626558.00	723117.00	1.50	38.9
NSR02_A	Bungalo for NSR02	626528.00	723104.00	1.50	39.9
NSR03_1_A	Bungalo for NSR03	626498.00	723096.00	1.50	39.9
NSR03_2_A	Small house with windows outside NSR03	626489.56	723078.79	1.50	40.1
NSR04_A	Bungalo NSR04	626469.00	723089.00	1.50	38.1
NSR05_A	Bungalo NSR05	626426.00	723082.00	1.50	36.6
NSR06_1_A	Bungalo NSR06	626356.75	722964.87	1.50	47.1
NSR06_2_A		626356.51	722959.91	1.50	47.3
NSR06_2_B		626356.51	722959.91	4.00	48.0
NSR07_A	Bungalo NSR07	626184.00	722910.00	1.50	34.7
NSR08_A	Bungalo NSR08	626106.00	722757.00	1.50	33.9
NSR09_A		627481.93	723229.86	1.50	27.3
NSR09_B		627481.93	723229.86	4.00	29.6
NSR10_A		627280.13	723403.38	1.50	30.7
NSR10_B		627280.13	723403.38	4.00	31.3

All shown dB values are A-weighted

RECEIVED: 23/05/2025

APPENDIX 10

APPENDIX 10-1

Appendix 10-1

Mineral Dust Risk Assessment

Condron Concrete Limited

Ardan Road, Tullamore, Co. Offaly

Contents

FIGURES

TABLES

1 DISAMENTIY DUST RISK ASSESSMENT

The IAQM Guidance aims to provide advice on robust and consistent good-practice approaches that can be used to assess the operational phase dust impacts from quarry activities. [1]

1.1 Identification of Sensitive Receptors

For the sensitivity of people and their property to dust soiling, the IAQM recommends the use of professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies. The following classification was used to define a receptor with High, Medium or Low sensitivity to dust soiling:

High Sensitive Receptor

- Users can reasonably expect enjoyment of a high level of amenity; and,
- The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

Indicative examples of a high sensitivity receptor included dwellings, medium- and long-term carparks and car showrooms.

Medium Sensitive Receptor:

- Users would expect a to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
- The appearance, aesthetics or value of their property could be diminished by soiling; and,
- The people or property wouldn't reasonably be expected a to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.

Indicative examples include parks, and places of work.

Low Sensitivity Receptor

- The enjoyment of amenity would not reasonably be expected;
- There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; and,
- There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.

Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

1.2 Determining the Residual Source of Emissions

The following examples show the residual source emissions for a number of activities, illustrating the factors that may be considered when determining the potential impact.

Figure 1-1: Site Preparation/ Restoration

LARGE	SMALL
Large working area	Small working area
High bunds	Low bunds
High volume of material movement	Low volume of material movement
High no. heavy plant	Low no. heavy plant
Minimal seeding/sealing of bund surface	Bunds seeded/sealed immediately
Material of high dust potential	Material of low dust potential

An example of a large potential dust magnitude from site preparation/restoration may include factors such as a working area >10ha, bunds >8 m in height, >100,000 m^3 material movement, >10 heavy plant simultaneously active, bunds un-seeded, fine grained and friable material. Conversely, a small potential dust magnitude may include a site with a working area <2.5ha, bunds <4m in height, <20,000 m^3 material movement, <5 heavy plant simultaneously active, all bunds seeded, material with a high moisture content.

Figure 1-2:Mineral Extraction

LARGE	SMALL
Large working area	Small working area
High energy extraction methods	Low energy extraction methods
Material of high dust potential	Material of low dust
Potential high extraction rate	Low extraction rate

An example of a large potential dust magnitude from mineral extraction may include a working area >100 ha, drilling and blasting frequently used, dusty mineral of small particle size and/or low moisture content, 1,000,000 tpa extraction rate. A small potential magnitude may include working area <20 ha, hydraulic excavator, coarse material and/or high moisture content, <200,000 tpa extraction rate.

Figure 1-3: Materials Handling

LARGE	SMALL
High no. heavy plant	Low no. heavy plant
Unconsolidated/bare surface	Hard standing surface
Activities close to site boundary	Activities within quarry void
Material of high dust potential	Material of low dust potential

An example of a large potential dust magnitude from materials handling may include factors such as >10 loading plant within 50m of a site boundary, transferring material of a high dust potential and/or low moisture content on dry, poorly surfaced ground. Conversely, a small potential dust magnitude may include <5 plant, more than 100 m of a site boundary, within the quarry void or clean hardstanding, transferring material of low dust potential and/or high moisture content.

Figure 1-4: Onsite Transportation

LARGE	SMALL
Use of unconsolidated haul roads	Use of conveyors
Unpaved haul roads	Paved haul roads
Road surface of high dust potential	Road surface of low dust potential
High no. HDV movements	Low no. HDV movements
High total length of haul roads	Low total length of haul roads
Uncontrolled vehicle speed	Controlled (low) vehicle speed

An example of a large potential dust magnitude from on-site transportation could include >250 movements in any one day on unpaved surfaces of potentially dusty material. A small potential magnitude may include the employment of covered conveyors used for the majority of the on-site transportation of material, <100 movements of vehicles per day, with surface materials of compacted aggregate, <500 m in length and a maximum speed of 15 mph.

Figure 1-5:Mineral Processing

LARGE	SMALL
Raw material of high dust potential	Raw material of low dust potential
End product of high dust potential	End product of low dust potential
Complex or combination of processes	Single process
High volume material processed	Low volume material processed

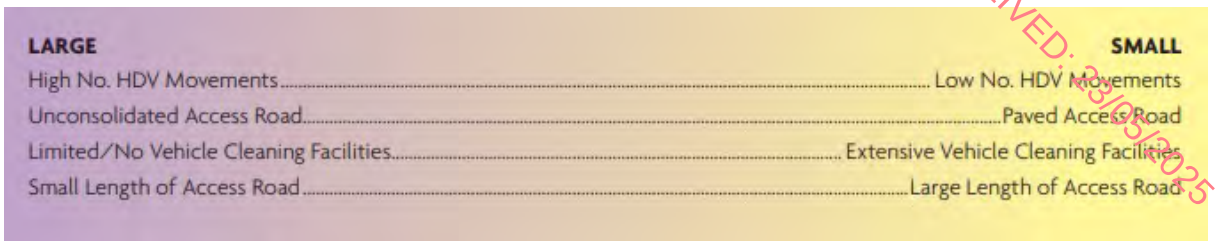
An example of a large potential dust magnitude from mineral processing may include factors such as a mobile crusher and screener with concrete batching plant on-site, processing >1,000,000 tpa of material with a high dust potential and/or low moisture content e.g. hard rock. Conversely, a small potential dust magnitude may include a site with a fixed screening plant with effective design in dust control, processing <200,000 tpa of material with a low dust potential and/or high moisture content e.g. wet sand and gravel.

Figure 1-6: Stockpiles/Exposed Surfaces

LARGE	SMALL
Long term stockpile	Short term stockpile
Frequent material transfers	Infrequent material transfers
Material of high dust potential	Material of low dust potential
Ground surface unconsolidated/un-kept	Ground surface hardstanding/clean
Stockpiles close to site boundary	Stockpiles well within quarry void
Large areas of exposed surfaces	Small areas of exposed surfaces
High wind speeds/low dust threshold	Low wind speeds/high dust threshold

An example of a large potential dust magnitude from stockpiles and exposed surfaces could include a stockpile with a total exposed area >10 ha in an area exposed to high wind speeds located <50 m of the site boundary. Daily transfer of material with a high dust potential and/or low moisture content. Stockpile duration >12 months and quarry production >1,000,000 tpa. A small potential magnitude may include stockpile duration of <1 month with a total area <2.5 ha in an area of low wind speeds, located >100 m from the site boundary. Weekly transfers of material with a low dust potential and/or high moisture content. Quarry production <200,000 tpa.

Figure 1-7:Offsite Transportation



An example of a large potential dust magnitude from off-site transportation could include total HDV >200 movements in any one day on unsurfaced site access road <20 m in length with no HDV cleaning facilities. No road sweeper available. A small potential magnitude may include <25 HDV movements per day, paved surfaced site access road >50 m in length, with effective HDV cleaning facilities and procedures, the employment of an effective road sweeper.

1.3 Estimation of the Pathway Effectiveness

The site-specific factors considered to determine the Effectiveness of the Pathway were distance and direction of receptors relative to prevailing wind directions. Receptors were identified within 400m of the dust emission source. Table 1-1 shows the categorisation of the frequency of potentially dust winds, based on the meteorological data from a nearby weather station.

Table 1-1: Categorisation of Frequency of Potentially Dust Winds

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are less than 5%
Moderately Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table 1-2 below shows the categorisation of receptors, based on their distance to the dust emission source.

Table 1-2:Categorisation of Receptor Distance from Source

Distance Category	Criteria
Distant	Receptor is between 200m and 400m from the dust source
Intermediate	Receptor is between 100m and 200m from the dust source
Close	Receptor is less than 100m from the dust source

Table 1-3 below shows the determination of the Pathway Effectiveness based on the frequency of potentially dusty winds and the distance of the receptor from the dust emission source.

Table 1-3: Classification of the Pathway Effectiveness

Receptor Distance Category	Frequency of Potentially Dusty Winds			
	Infrequent	**Moderately Frequent**	**Frequent**	**Very Frequent**
Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

1.4 Estimation of the Dust Impact Risk and Effects

Table 1-4 shows the estimation of the Dust Impact Risk based on the Residual Source of Emission and Pathway Effectiveness classifications

Table 1-4: Estimation of Dust Impact Risks

Pathway Effectiveness	Residual Source Emission		
	Small	**Medium**	**Large**
Highly Effective Pathway	Low Risk	Medium Risk	High Risk
Moderate Effective Pathway	Negligible Risk	Low Risk	Medium Risk
Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

Table 1-5 below shows the estimate of the likely magnitude of Disamenity Effects based on the receptor sensitivity and the risk of dust impacts.

Table 1-5: Descriptors for magnitude of Dust Effects

Receptor Distance Category	Receptor Sensitivity		
	Low	**Medium**	**High**
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible effect	Negligible effect	Slight Adverse Effect
Negligible Risk	Negligible effect	Negligible effect	Negligible effect

2 REFERENCES

[1] IAQM, "Guidance on the Assessment of Mineral Dust Impacts for Planning," Institute of Air Quality Management, London, 2016.

APPENDIX 11

APPENDIX 11-1

1 CHARACTERISING CLIMATE HAZARDS

1.1 Frequency of Climate Hazards according to Annex B [1]

Table 1-1: Classifying the frequency of climate hazards

Frequency	Frequency Occurrence in a Year	Description
Very Frequent	>100%	Occurs several times in a single year
Frequent	50 to 100%	Occurs once in a 1-to-2-year period
Common	10 to 50%	Occurs once in a 2-to-10-year period
Occasional	1 to 10%	Occurs once in a 10–100-year period
Rare	<1%	occurs once in over 100 years

1.2 Vulnerability Types

Table 1-2: Description of different vulnerability types [1]

Vulnerability Type	Frequency Occurrence in a Year
Physical Vulnerability	Properties of an asset related to the structure or facilities can exacerbate/reduce the impacts before, during, or after a hazard event e.g. poor design and the construction of building, provision of active cooling. **or;** Ability of a population/persons to access equipment or resources that can exacerbate/reduce the impacts before, during, or after a hazard event.

1.3 Level of Impacts

Table 1-3:Description of level of impacts [1]

Impact	Description	Level of Impact
Catastrophic	Widespread service failure with services unable to cope with wide-scale impacts	5
Major	Services seen to be in danger of failing completely with sever/widespread decline in service provision	4
Moderate	Service provision under severe pressure. Appreciable decline in	3

	service provision at a community level	
Minor	Isolated but noticeable examples of service declines	2
Negligible	Appearance or threat but no actual impact on service provision	1

1.4 Magnitude of Impact for Asset Damage Category

Table 1-4: Magnitude of impact relating to Asset Damage [1]

Risk Area	Negligible	Minor	Moderate	Major	Catastrophic
Asset Damage	Impact can be absorbed through normal activity	An adverse event that can be absorbed by taking business continuity action	A serious event that requires additional emergency business continuity	A critical event that requires extraordinary/emergency business continuous actions	Disaster with the potential to lead to shutdown or collapse or loss of assets network

2 IDENTIFICATION OF CLIMATE HAZARDS

2.1 Offaly County Council Climate Change Adaption Strategy

The Offaly County Council Climate Change Adaption Strategy has evaluated the risks due to climate change using the following scale (Table 2-1 below) [2] The Risk is measured as a product of the Consequence and Likelihood relating to hazards

Table 2-1:Offaly County Council Risk Scale

Consequence Description	Consequence Score	Likelihood Description	Likelihood Score
Critical	5	Almost Certain	5
Major	4	Likely	4
Moderate	3	Possible	3
Minor	2	Unlikely	2
Negligible	1	Rare	1

2.2 ThinkHazard

ThinkHazard is a web-based tool enabling non-specialists to consider the impacts of disasters on new development projects, commissioned by the Global Facility for Disaster Reduction and Recovery [3]. Hazards are provided at a local administrative resolution and is based on the following scale (Table 2-2).

Table 2-2:Hazard Classification provided by ThinkHazard

Scale	Description
High	Users should be highly aware of potential severe damage from this hazard for the project location. Without taking measures to mitigate the hazard and risk, high levels of damage can be expected to occur within the project or human lifetime
Medium	Users should be aware of potentially damaging effects of this hazard for the project location. Potentially damaging events can be expected to occur within the project or human lifetime and measures to mitigate the hazard and risk should be considered.
Low	Potentially damaging events are less likely to occur within the project or human lifetime but are still possible. Measures to mitigate the hazard and risk would be prudent at critical locations.
Very Low	Available data suggests that potentially damaging effects are unlikely to occur, on average, in the project or human lifetime.

2.3 Climate Change Adapt (European Commission)

The Climate -ADAPT platform is maintained by the European Commission and the European Environment Agency. Climate -ADAPT aims to support Europe in adapting to climate change, helping users to access and share data. The platform includes a database that contains quality checked information and country level reports [4].

At the time of writing, the Climate ADAPT platform does not provide a quantitative assessment on the level of risks associated with the potential hazards to a country.

2.4 Climate Hazards associate with the Proposed Development

Table 2-3 below highlights the hazards identified through desk-based research.

Table 2-3:Hazards identified as relevant from available resources

Source	Hazards Identified	Category of Risk (if applicable)
Offaly County Council Climate Action Plan [2]	• Heatwaves; • Cold weather; • Droughts; • Flooding; • Extreme Rainfall	• Moderate; • Moderate-critical; • Major; • Critical; • Moderate
ThinkHazard [3]	• Wildfire; • River Flood; • Urban Flood; and; • Extreme Heat.	• Medium; • Low • Low; • Low
Climate-ADAPT [4]	• Temperature (extreme highs and lows, wildfires); • Winds (Storms); • Water (Drought, Floods, Extreme Rainfall; and, • Solid Mass.	**Not Identifiable**

3 REFERENCES

[1] GOI, "Technical Annex B Climate Change Risk Assessment," Government of Ireland , Dublin, 2023.

[2] KCC, "Offaly County Council, Climate Change Adaption Strategy 2019-2024," Offaly County Council, Offaly, 2019.

[3] GFDRR, "Think Hazard," Global Facility for Disaster Reduction and Recovery, 30 June 2020. [Online]. Available: https://thinkhazard.org/en/about. [Accessed 16 February 2023].

[4] EC, "Climate Adapt," European Commission , 2023. [Online]. Available: https://climate-adapt.eea.europa.eu/#t-countries. [Accessed 16 08 2023].