

Spink Quarry, Knockbaun, Abbeyleix, Co. Laois

Spink Quarry

Environmental Impact Assessment Report

Appendix 7.3

Spink Geophysical Survey (Apex 2021)

2021



Part of the Breedon Group

Prepared by:

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AGP21065_03_REV1

**REPORT
ON THE
GEOPHYSICAL INVESTIGATION
AT
SPINK QUARRY
Co. LAOIS
FOR
LAGAN MATERIALS LTD.**



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6TH July 2021

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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.

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1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Lagan Materials Ltd. to carry out a geophysical investigation at the Spink Quarry in Co. Laois to identify the presence of possible water bearing features in the bedrock, and in particular the extent of a water-bearing sand filled cavity identified in a well in the west of the site.

The geophysical survey comprising of 9 electrical resistivity tomography (ERT) profiles, was carried out across the quarry floor on the 30th April and on the 4th and 28th May, 2021.

The quarry floor lies at an average elevation of approx. 225 mOD with a number of settlement ponds located in the southwest and northwest corners of the quarry, and a quarry sump in the southeast.

The Geological Survey of Ireland (GSI) Bedrock Geology map indicates that the site is underlain by Clay Gall Formation **sandstones**. The Clay Gall Sandstone Formation is overlain by the Coolbaun Formation **shale and sandstone** with thin coals and underlain by the Moyadd Coal Formation **shale, siltstone & minor sandstone**.

Two rotary core boreholes (20-SP-01 & 20-SP-02) drilled on the quarry floor encountered 19.8 to 31 m of Clay Gall Formation strong massive sandstone with rare clay galls and siltstone over Moyadd Coal Formation mudstone with rare thin sandstones and siltstones. A recent well (PW2) drilled in the west of the quarry encountered a sand filled cavity with a high-water yield of 900 m³/d near the base of the sandstone/siltstone. Two rotary core boreholes (20-SP-03 & 20-SP-04) drilled at higher elevations east of the quarry floor and sump encountered Coolbaun Formation interbedded siltstones and mudstones with occasional sandstones, underlain by upper Coolbaun Formation interbedded sandstone and siltstone, underlain by massive sandstone of the lower part of the Clay Gall Sandstone, underlain by Moyadd Formation mudstones.

The ERT data confirm the thickening of the Clay Gall Formation sandstones from north to south beneath the quarry floor and indicate that the beds dip at an apparent angle of approx. 10° to the southwest. The high yielding sand layer in PW2 occurs near the base of the dipping sandstone beds of the Clay Gall Formation. The data shows no indication that this is part of a localised fault or weathered zone.

The data suggest a permeable water bearing bed of weak sandstone at the base of the sandstone/siltstone unit and dipping to the southwest and slightly to the east and terminated at the south of the quarry by an east-west vertical fault which places the sandstone/siltstone against lower permeability siltstone/sandstone. Such a model would have an increased head of groundwater as one moves to the southwest and may account for the water bearing feature encountered near the base of the sandstone/siltstone on PW2 compared to the low or absent flow on PW3 further up dip to the northeast.

From the geophysical and borehole data the main water-bearing layer at the base of the sandstone should be below the proposed floor levels of 206 mOD, 200 mOD and 190 mOD in the northwest, centre and southeast of the site.

The geophysical report should be reviewed after the completion of any further direct investigation.

2. INTRODUCTION

APEX Geophysics Limited was requested by Lagan Materials Ltd. to carry out a geophysical investigation at the Spink Quarry, east of Abbeyleix in Co. Laois to identify the presence of possible water bearing features in the bedrock, and in particular the extent of a water-bearing sand feature identified in a well in the west of the site.

2.1 Survey Objectives

The objectives of the investigation were:

- to provide information on the underlying bedrock geology
- to investigate the presence of the water-bearing sand feature within the bedrock

2.2 Site Background

The Spink Quarry is located along the R430 between Abbeyleix and The Swan, approximately 10 km east of Abbeyleix (Fig. 2.1). The site topography averages around 225 mOD on the quarry floor rising to 230 mOD in the east/northeast. A number of settlement ponds are located in the southwest and northwest corners, and a quarry sump is located in the southeast. Extraction depths of 206 mOD, 200 mOD and 190 mOD are proposed in the northwest, centre and southeast of the quarry respectively.

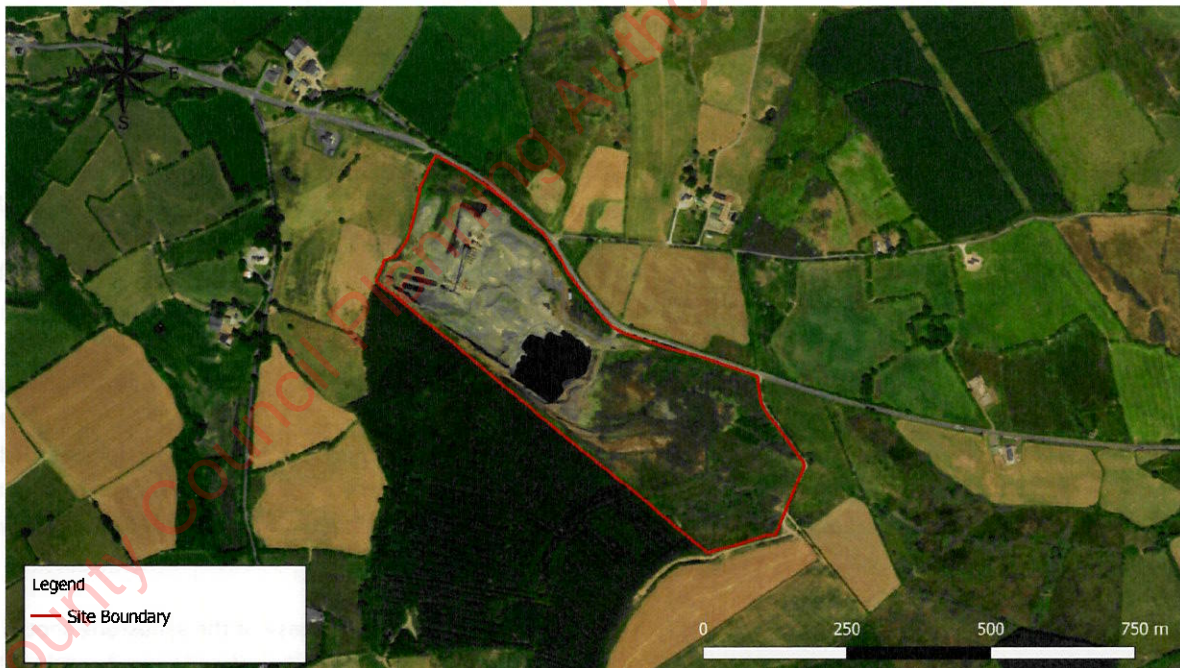


Figure 2.1. Site location indicated by red boundary.

2.2.1 Geology

The Geological Survey of Ireland (GSI) 1:100k Bedrock Geology map for the area (GSI, 2018) indicates that the site is underlain by the **Clay Gali Sandstone Formation** (Fig. 2.2), described as being between 30 to 50 m thick and composed of medium to fine-grained quartz sandstones with minor feldspar content. It is also described as being well-cemented with silica resulting in a non-porous rock of quartzitic character. The Clay Gali Sandstone

Formation is overlain by the **Coolbaun Formation** shale and sandstone with thin coals and underlain by the **Moyadd Coal Formation** shale, siltstone & minor sandstone. A fault was observed in the quarry face directly north of the settlement ponds in the southwest.

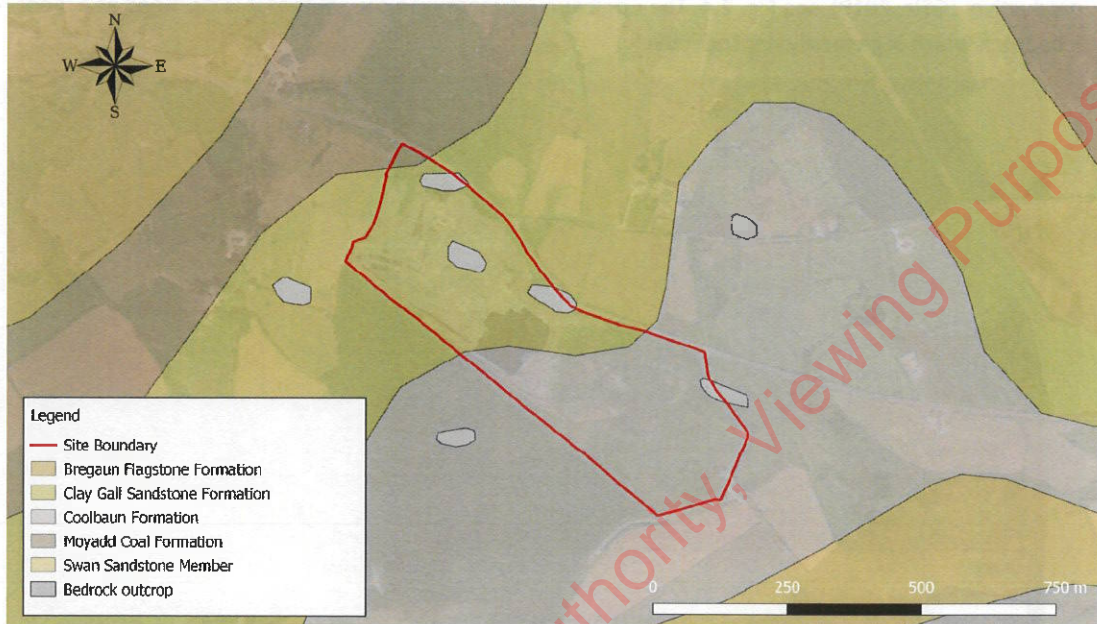


Figure 2.2. Geological map for the survey area (site marked in red).

2.2.2 Soils

The Quaternary sediments map for the area (GSIa, 2019) indicates that the site is dominated by subcropping/outcropping rock with till derived from Namurian sandstones and shales (Fig. 2.3).

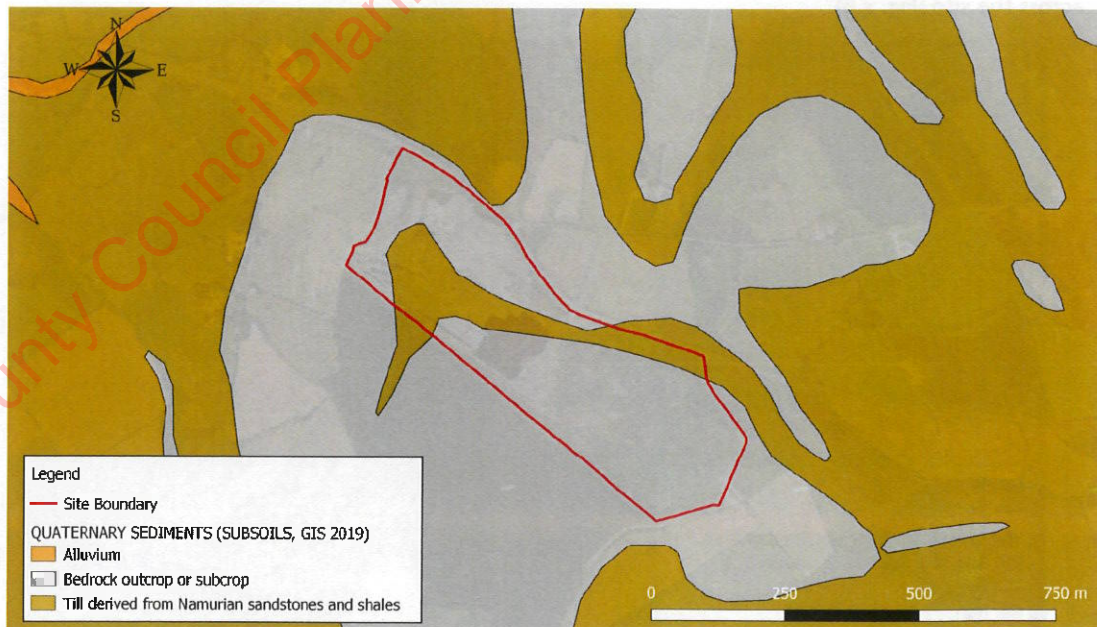


Figure 2.3: Teagasc soil map (site marked in red).

2.2.3 Groundwater

The Clay Gall Formation is classified as a ‘Locally Important Aquifer – bedrock which is generally moderately productive’ (GS1c, 2019), see Fig. 2.4. The Coolbaun Formation to the southeast is classified as a ‘Poor Aquifer – bedrock which is generally unproductive’.

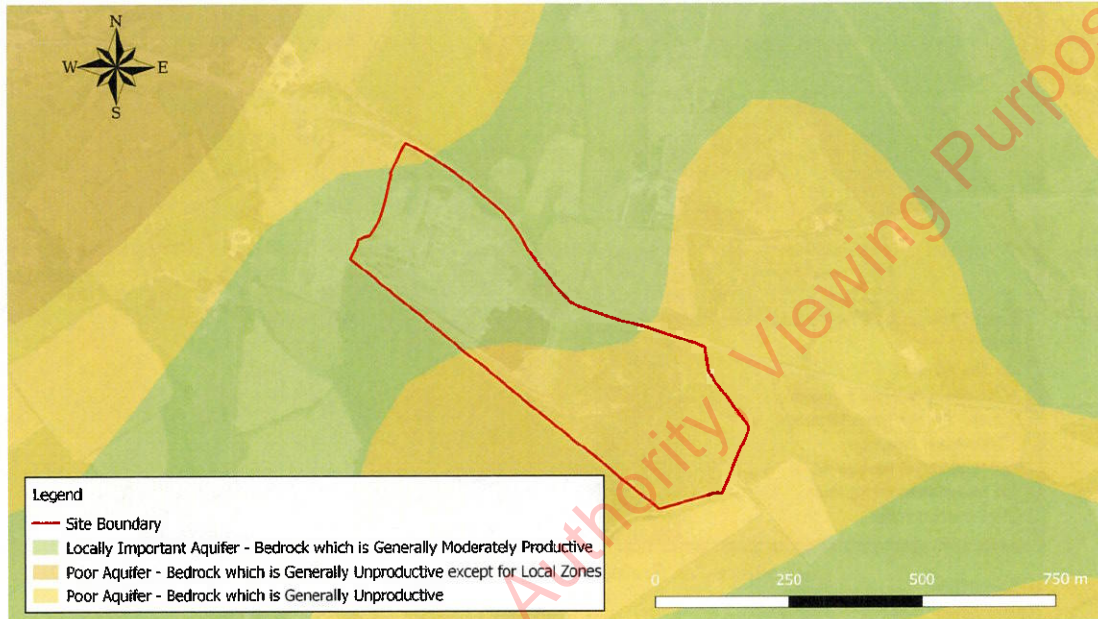


Fig 2.4: Bedrock aquifer (site marked in red).

The groundwater vulnerability (GS1b, 2019) is classified as ‘extreme’ and ‘extreme - rock at or near surface’ across the site (Fig. 2.6).

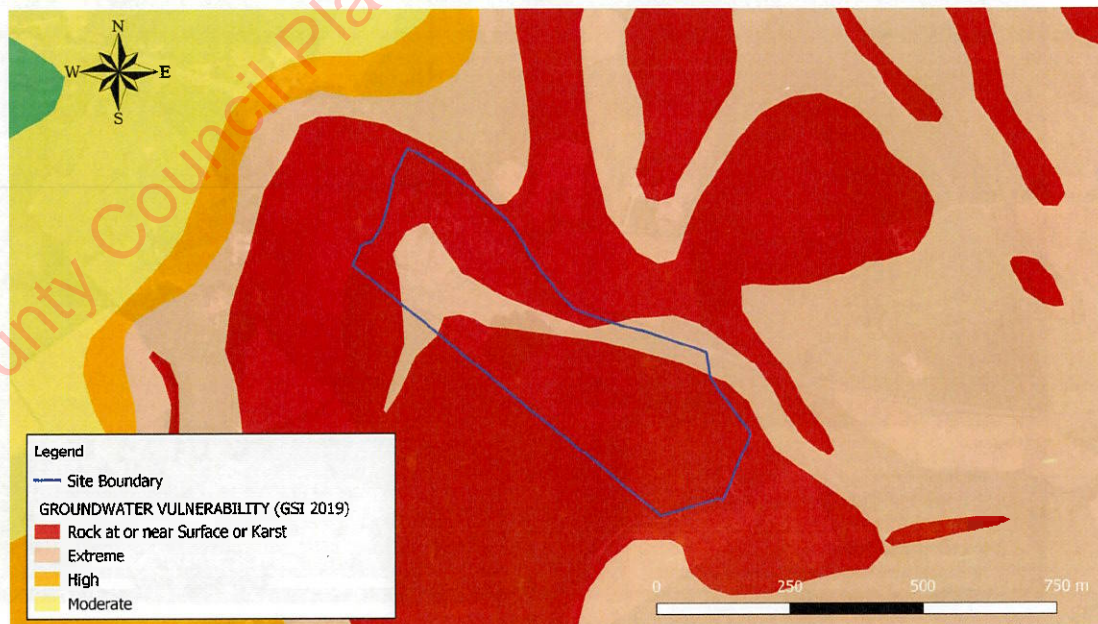


Fig 2.6. Groundwater vulnerability classification for the survey area (site marked in blue).

2.2.4 Historical Data

The historical 6 inch sheet for the area (Fig. 2.7) shows rock in the vicinity of the site dipping 5 to 15 degrees to the southwest. The outcrop is described as olive or grey 'grit'.

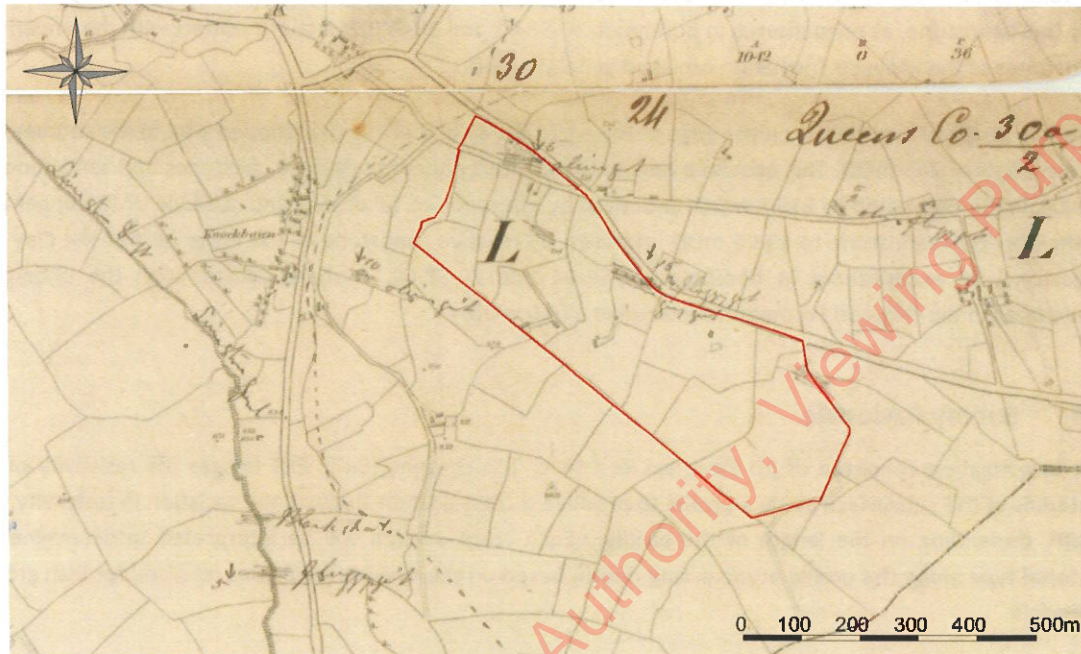


Fig 2.7: The historical 6 inch map (site marked in red).

2.3 Previous Investigation

Two rotary core boreholes (20-SP-01 & 20-SP-02) were drilled on the quarry floor within the survey area in 2020 to 30 and 40m below ground level (bgl), respectively. 20-SP-01 encountered 19.8 m of strong massive sandstone with rare clay galls over mudstone with rare thin sandstones and siltstones of the Moyadd Coal Formation. 20-SP-02 encountered strong massive sandstone interbedded with siltstone to 6.7 m bgl and strong massive sandstone with rare clay galls to 31 m bgl, both of the Clay Gall Sandstones over mudstone with rare thin sandstones and siltstones of the Moyadd Coal Formation.

Well PW02 was drilled in the west of the quarry in 2021 and encountered 5 m thick overburden (sand/made ground) over sandstone interbedded with siltstone. Well PW02 encountered a cavity from 16-17 m bgl with a high yield of 900 m³/d sand layer with mudstone from 19 m bgl to termination depth at 44 m bgl. Borehole PW03 was drilled in the north of the quarry in 2021 and encountered 18 m of sandstone/siltstone over mudstone to termination depth at 56 m bgl. Flows of between 10 – 20 m³/d were recorded from around 16 m bgl.

Almost all of the quarry is developed within the Clay Gall Sandstone Formation with beds typically dipping towards the southeast, varying from <5° to 10° with local steepening in the northwest due to the presence of a small fault. The exposed quarry faces show a massive thick uniform sandstone at the base of the formation with a more variable interbedded sandstone and siltstone unit towards the top of the formation.

Borehole 20-SP-03 was drilled further to the southeast at an elevation of 239 mOD. This borehole, collared much higher in the sequence, encountered interbedded siltstones and mudstones with occasional sandstones of the upper part of the Coolbaun Formation to 226.8 mOD, underlain by interbedded sandstone and siltstone of the Clay Gall Sandstone to 209.4 mOD underlain by massive sandstone of the lower part of the Clay Gall Sandstone, as encountered in boreholes 20-SP-01 and 20-SP-02. A sharp contact with the underlying mudstones of the Moyadd Formation occurred at 183.0 mOD.

Borehole 20-SP-04 was drilled on the edge of the agricultural land above the stripped area to the southeast at an elevation of 245 mOD. This borehole encountered interbedded mudstones, siltstones and sandstones of the Coolbaun Formation to 219.3 mOD, underlain by interbedded sandstone and siltstone of the upper part of the Clay Gall Sandstone to 193.5 mOD underlain by massive sandstone of the lower part of the Clay Gall Sandstone, as encountered in boreholes 20-SP-01 and 20-SP-02. A sharp contact with the underlying mudstones of the Moyadd Formation occurred at 173.0 mOD.

2.4 Survey Rationale

The investigation consisted of 2D Electrical Resistivity Tomography (ERT). ERT images the resistivity of the materials in the subsurface along a profile to produce a cross-section showing the variation in resistivity with depth, depending on the length of the profile. Each cross-section will be interpreted to determine the material type along the profile at increasing depth, based on the typical resistivities returned for Irish ground materials.

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. Further information on the detailed methodology employed in this investigation is given in **APPENDIX A: DETAILED GEOPHYSICAL METHODOLOGY**.

3. RESULTS

The survey was carried out on the 30th April and the 4th and 28th May, 2021 involving the collection of 9 ERT profiles (R1 to R9). The survey covered an area of approximately 7 ha. The geophysical survey locations are indicated on Drawing AGP21065_01 (Appendix C). The geophysical results and interpretation are presented on Drawings AGP21065_R1 to AGP21065_R9.

3.1 Modelled ERT

In conjunction with the borehole information, the modelled resistivity values have been interpreted on the following basis.

Resistivity (Ohm-m)	Interpretation
100-250	Made Ground/Gravelly SILT/CLAY or water saturated fractured rock
100-300	MUDSTONE (Possible Coolbaun Fmtn.)
300-500	SILTSTONE with SANDSTONE/MUDSTONE
250-500	Fractured SANDSTONE with SILTSTONE/MUDSTONE (Clay Gall Fmtn.)
500 - 2000	SANDSTONE with SILTSTONE/MUDSTONE (Clay Gall Fmtn.)
300-800	MUDSTONE (Moyadd Fmtn.)

Some low resistivity values of 100 – 250 Ohm-m in the vicinity of the settlement ponds and well PW2 have been interpreted as made ground and/or gravelly silt/clay.

The Clay Gall Formation sandstones are indicated by resistivity values in the range 250-2000 Ohm-m with some low resistivity values in the upper few metres of the quarry floor (250-500 Ohm-m) associated with blast induced fracturing/relaxation joints. Water saturated fractured rock may also account for some of the low near-surface resistivity values from 100-250 Ohm-m.

The underlying Moyadd Formation mudstones are indicated by resistivity values in the range 350-800 Ohm-m. Low resistivities (100-300 Ohm-m) in the overlying Coolbaun Formation seen on ERT profile R9, east of the sump have been interpreted as mudstones.

3.2 Interpretation

The ERT profiles R4 and R5 confirm the thickening of the Clay Gall Formation sandstones from north to south beneath the quarry floor (note: the north of R4 appears to be affected by concrete/ foundations and is not included in the interpretation). The ERT indicates that the beds dip at an apparent angle of approx. 10° to the southwest (see Drawings AGP21065_R4 & AGP21065_R5) and are underlain by Moyadd Formation mudstones. R2 runs parallel to strike across the quarry floor in agreement with this interpretation (Drawing AGP21065_R2) and also shows an increase in thickness of the sandstone/siltstone to the southeast. R7 and R8 in the southeast of the quarry floor also show thick sandstone/siltstone. The interpreted geology from the ERT profiles shows good agreement with the adjacent boreholes and wells which have been drawn on the sections.

PW2 is located along profile R4 and at the western end of profile R2. The high yielding sand layer occurs near the base of the dipping sandstone beds of the Clay Gall Formation.

R9 was recorded east of the quarry sump at elevations from 234 to 244 mOD. This profile indicates mudstones and siltstone/sandstone over sandstone in the northern half of the profile.

Potential source of inflow on PW2

1. The ERT data shows no indication that the high yielding sand feature in PW2 is part of a localised fault or weathered zone and therefore could be associated with a water-bearing layer of weak sandstone at the base of the Clay Gall Sandstone unit. As such it would extend across the quarry to the southwest and southeast.
2. Profiles R6 and R7 were recorded in the south-eastern end of the quarry and indicate a vertical contact between the sandstone/siltstone to the northeast and lower resistivity, possible siltstone with sandstone to the south. The steeply vertical nature the contact suggests that it is faulted. Similar vertical changes in rock resistivity are visible on ERT profile R3 which has lower than expected resistivity values than expected from the dipping sandstone/siltstone layer on R2, R4, R5 and R7 to the northeast. R8 is oblique to the interpreted fault and as such the sandstone/siltstone resistivities are slightly lower than observed north of the fault.
3. A fault was observed in the quarry face directly north of the settlement ponds and 30 m west of the PW2 well. This fault does not appear to trend east-west towards PW2 as it is not observed on profiles R4 and R5. It may be north-south trending which would be in line with possible faulting observed as vertical changes in rock resistivity on profile R3.
4. The following model is suggested: A permeable water bearing bed of weak sandstone at the base of the sandstone/siltstone unit and dipping to the southwest and slightly to the east and terminated at to the south of the quarry by an east-west vertical fault which places the sandstone/siltstone against lower permeability siltstone with sandstone. Such a model would have an increased head of groundwater as one moves to the southwest and may account for the water bearing feature encountered near the base of the sandstone/siltstone on PW2 compared to the low or absent flow on PW3 further up dip to the northeast.

From ERT Profile R2 and 20-SP-02 the base of the sandstone at the centre of the current quarry (Phase 1, Area 2) is at around 195 mOD and the main water-bearing layer should therefore be below the proposed floor level of 206/200 mOD at this point. On this basis it appears that the present water ingress into the southeastern sump is not related or connected to the water bearing feature encountered on PW2.

The interpreted base of the Clay Gall Formation sandstone/siltstone is plotted on Drawing AGP21065_02 and indicates that the beds dip from approx. 215 mOD in the northwest of the site to 174 mOD in the southeast with a possible offset of 4-5 m along the interpreted fault.

4. RECOMMENDATIONS

The geophysical report should be reviewed after the completion of any further direct investigation.

REFERENCES

Geotomo Software, 2006;
'RES2DINV Users Manual', Malaysia.

GSI, 2018;
Bedrock Geology 1:100,000 Shapefile. <http://www.gsi.ie/Mapping.htm>

GSIa, 2019;
Quaternary Subsoils Shapefile. <http://www.gsi.ie/Mapping.htm>

GSIb, 2019;
Groundwater Vulnerability Shapefile. <http://www.gsi.ie/Mapping.htm>

GSIc, 2019;
Bedrock Aquifer Shapefile. <http://www.gsi.ie/Mapping.htm>

APPENDIX A: DETAILED GEOPHYSICAL METHODOLOGY

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 a Tigre resistivity meter, imaging software, two 32 takeout multicore cables and up to 64 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.

Spatial Relocation

All the geophysical investigation 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.

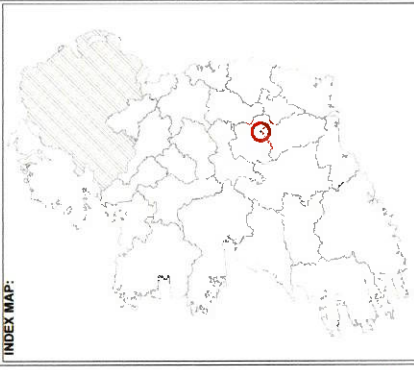
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Datum:	Ordnance
Coordinate units:	Metres
Altitude units:	Metres
Survey altitude reference:	MSL
Geoid model:	Republic of Ireland

APPENDIX B: DRAWINGS

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

AGP21065_01	Geophysical Locations	1:4000	@ A4
AGP21065_02	Summary Interpretation Map	1:4000	@ A4
AGP21065_R1	Results & Interpretation –R1	1:1000	@ A4
AGP21065_R2	Results & Interpretation –R2	1:1000	@ A4
AGP21065_R3	Results & Interpretation –R3	1:1000	@ A4
AGP21065_R4	Results & Interpretation –R4	1:1000	@ A4
AGP21065_R5	Results & Interpretation –R5	1:1000	@ A4
AGP21065_R6	Results & Interpretation –R6	1:1000	@ A4
AGP21065_R7	Results & Interpretation –R7	1:1000	@ A4
AGP21065_R8	Results & Interpretation –R8	1:1000	@ A4
AGP21065_R9	Results & Interpretation –R9	1:1000	@ A4

GEOPHYSICAL LOCATIONS
SCALE 1:4000



LEGEND:

- Site
- R1 2D resistivity profile
- + 20-SP-01 2020 Rotary Core Borehole
- + PWZ 2021 Wells
- ↘ Dip from Historical 6 inch mapping
- x Fault observed in quarry face

The information displayed here is to be used in conjunction with AGP21065_03 Report on the Geophysical Investigation at Spink Quarry, Co. Laois for Lagan, APEX Geophysics Ltd. 6th August 2021



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PROJECT: SPINK QUARRY, CO. LAOIS
GEOPHYSICAL SURVEY

CLIENT: LAGAN GROUP

DRAWING NO: AGP21065_01

SCALE: AS INDICATED @ A4

DATE: 29-06-2021

Version	Date	Drawn By	Checked:
01	14-05-2021	YOC	POC
02	03-06-2021	YOC	POC
03	29-06-2021	YOC	



Laois County Council Planning Authority. Viewing purposes only.

SUMMARY . . . RPRETATION MAP with INTERPRETED TOP OF MUDSTONE (m).
SCALE 1:4000

INDEX MAP:



KNOCKBAUN



- LEGEND:**
- Site
 - Possible Fault
 - ▲ 20-SP-01
 - ▲ PW
 - ▲ 2021 Wells
 - ↘ Dip from Historical 6 inch mapping
 - ↘ Dip from ERT profiles
 - x Fault observed in quarry face

The information displayed here is to be used in conjunction with AGP21065_03 Report on the Geophysical Investigation at Spink Quarry, Co. Laois for Lagan, APEX Geophysics Ltd. 6th August 2021

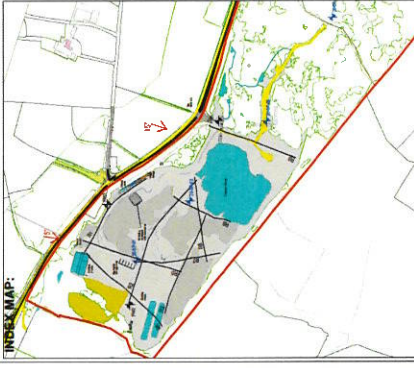
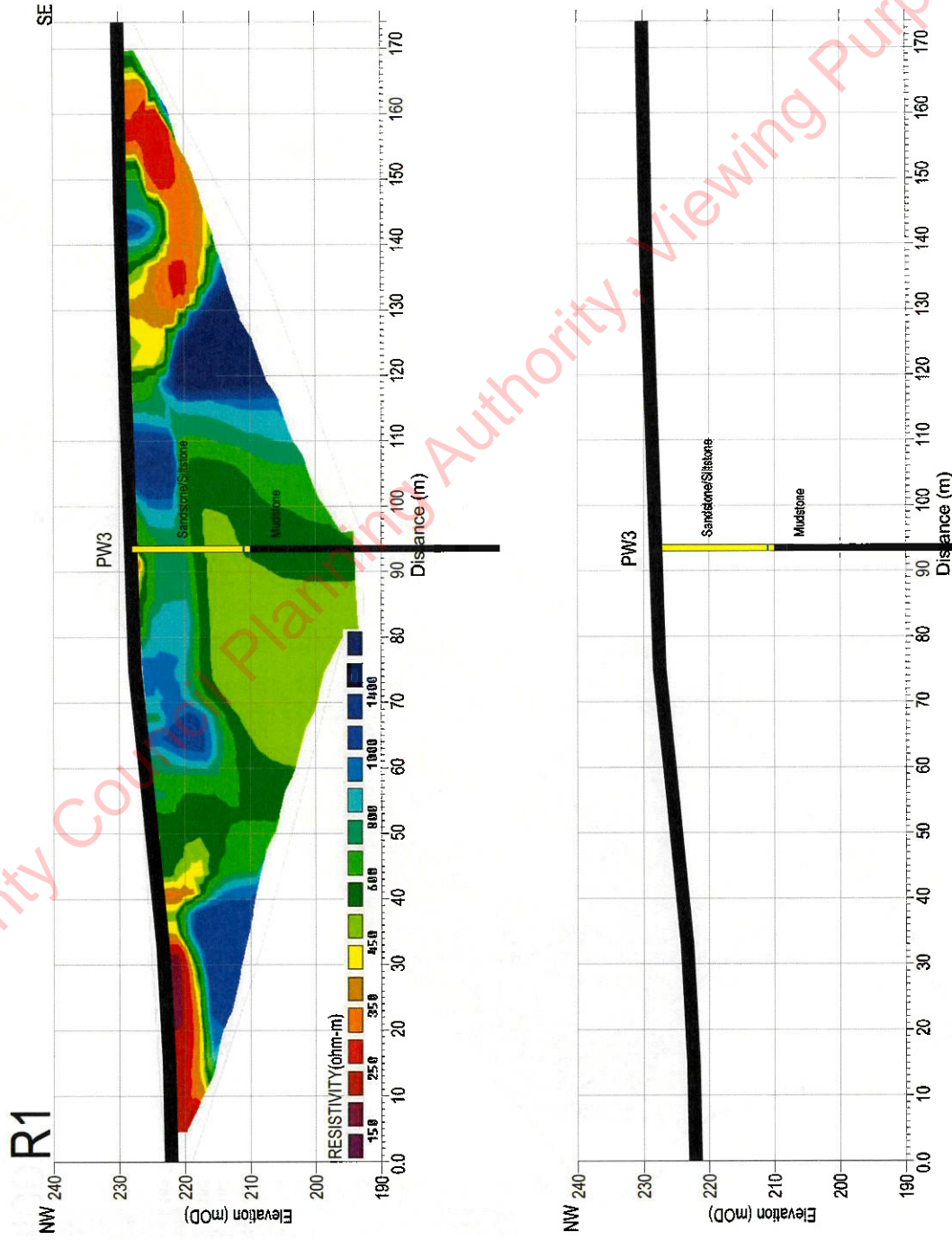


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PROJECT:	SPINK QUARRY, CO. LAOIS GEOPHYSICAL SURVEY		
CLIENT:	LAGAN GROUP		
DRAWING NO:	AGP21065_02		
SCALE:	AS INDICATED @ A4		
DATE:	29-06-2021		
Version:	Date:	Drawn By:	Checked:
01	14-05-2021	YOC	POC
02	03-08-2021	YOC	POC
03	29-06-2021	YOC	POC

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RESULTS & INTERPRETATION - R1
SCALE 1:1000



- LEGEND:**
- Made Ground and/or Gravelly SILTCLAY
 - Fractured ROCK
 - Fractured SANDSTONE/SILTSTONE
 - SANDSTONE/SILTSTONE
 - SILTSTONE/SANDSTONE
 - MUDSTONE
 - Possible Fault

The information displayed here is to be used in conjunction with AGP21065_03 Report on the Geophysical Investigation at Spink Quarry, Co. Laois for Lagan, APEX Geophysics Ltd. 6th August 2021



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CLIENT: LAGAN GROUP

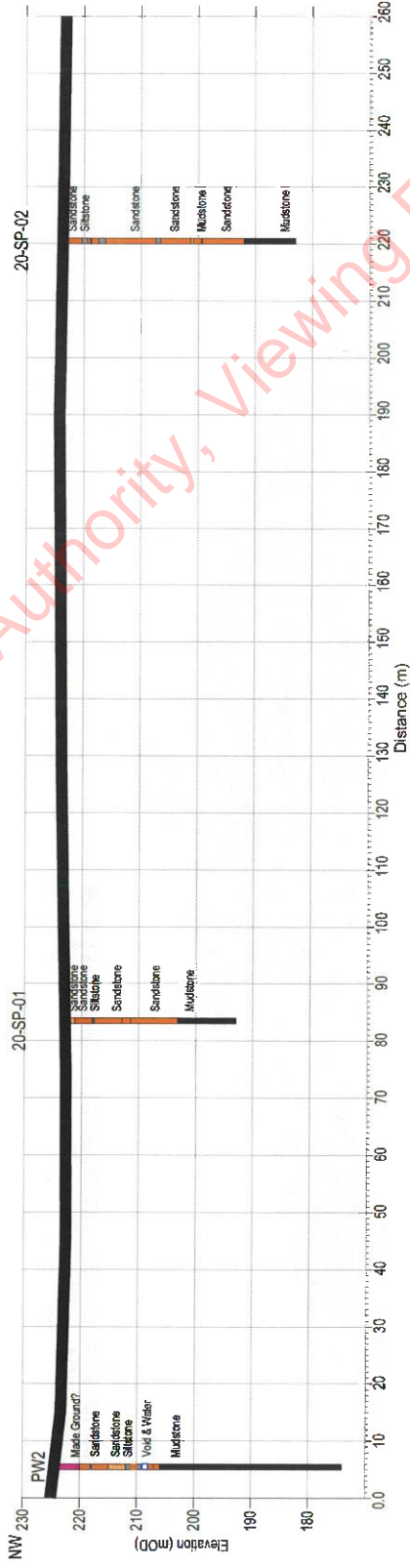
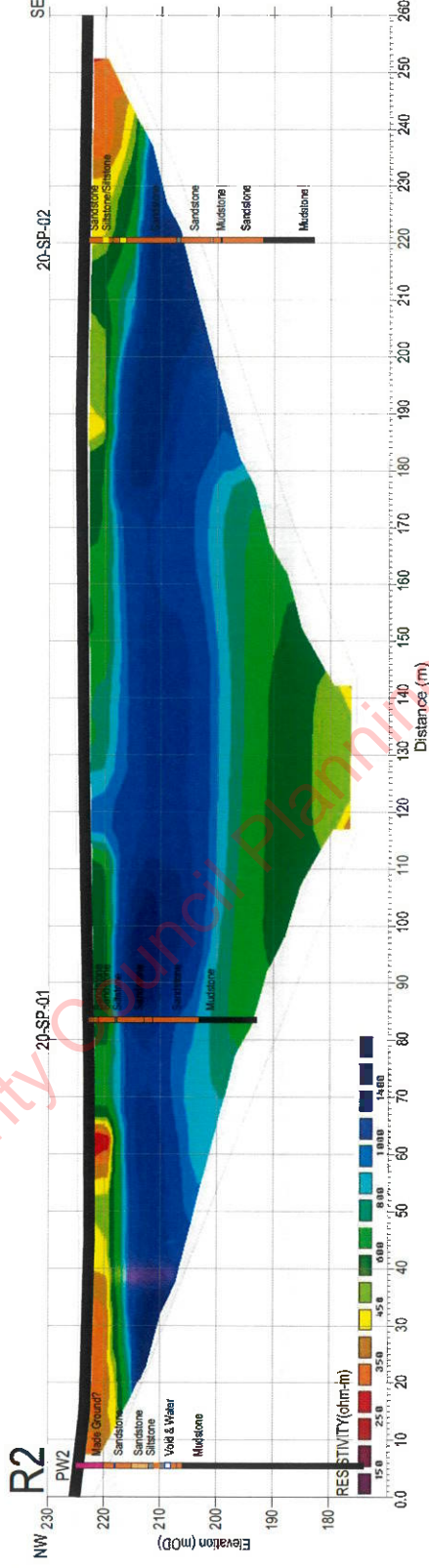
DRAWING NO: AGP21065_R1

TITLE: AS INDICATED @A4

DATE: 29-06-2021

Version:	Date:	Drawn By:	Checked:
01	14-05-2021	YOC	POC
03	29-06-2021	YOC	

RESULTS & INTERPRETATION - R2
SCALE 1:1250



LEGEND:

- Made Ground and/or Gravelly SILT/CLAY
- Fractured ROCK
- SANDSTONE/SILTSTONE
- SILTSTONE/SANDSTONE
- MUDSTONE
- Possible Fault

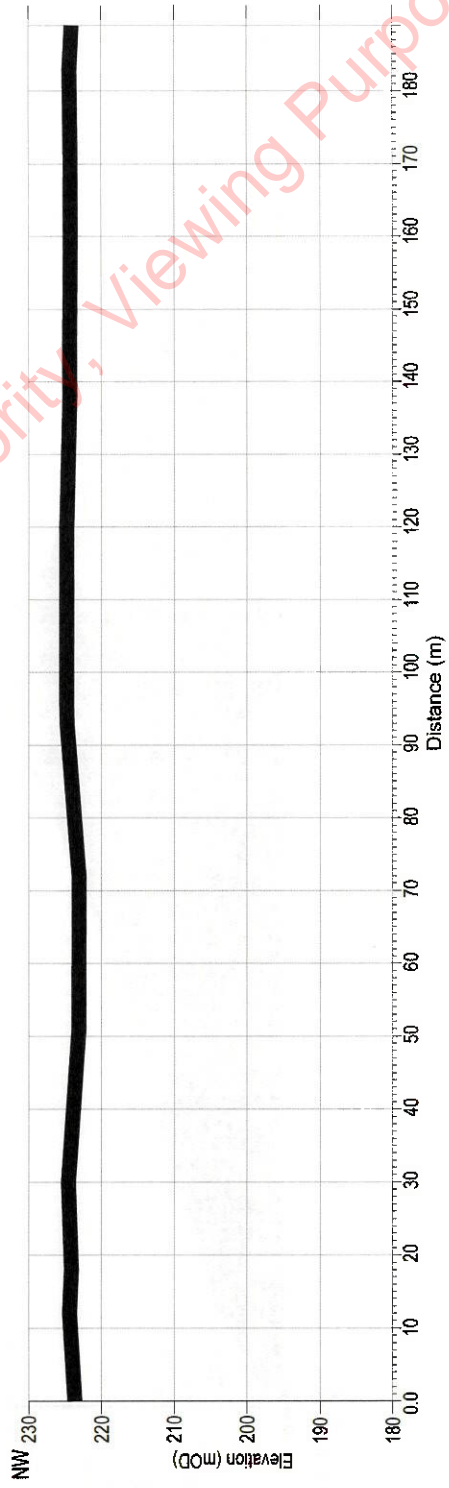
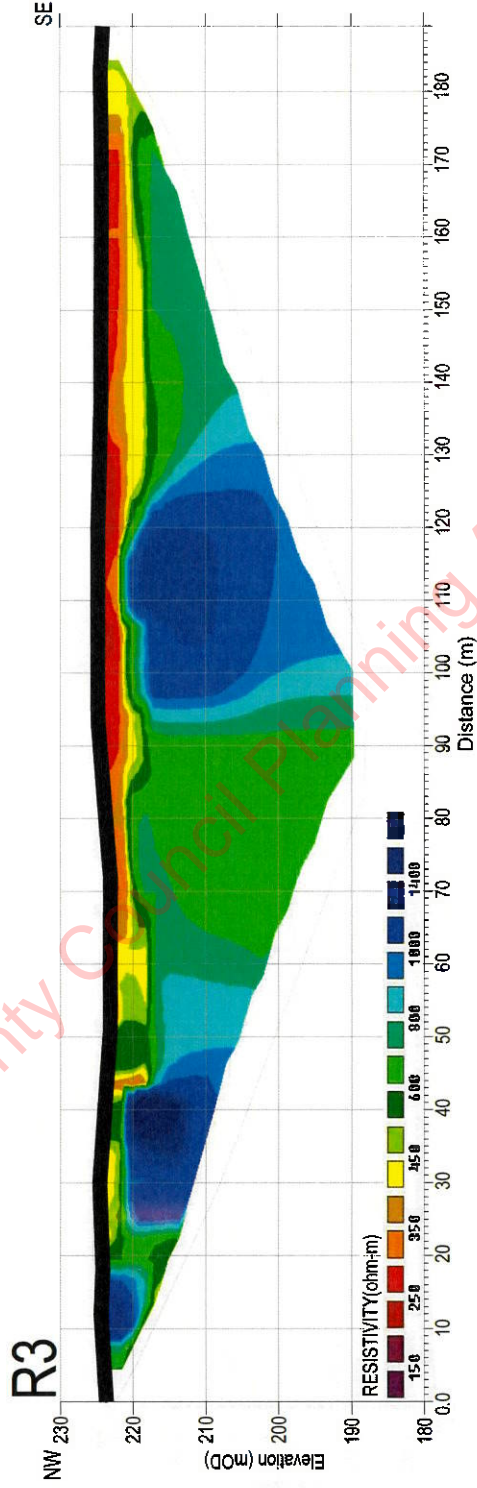
The information displayed here is to be used in conjunction with AGP21065_03 Report on the Geophysical Investigation at Spink Quarry, Co. Laois for Lagan, APEX Geophysics Ltd. 6th August 2021

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PROJECT:	SPINK QUARRY, CO. LAOIS		
CLIENT:	LAGAN GROUP		
DRAWING NO:	AGP21065_R2		
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Version:	Date:	Drawn By:	Checked:
01	14-05-2021	YOC	POC
03	28-06-2021	YOC	

Laois County Council Planning Authority, Viewing Purposes Only!

RESULTS & INTERPRETATION - R3
SCALE 1:1000



- LEGEND:
- Made Ground and/or Gravely SILT/CLAY
 - Fractured ROCK
 - Fractured SANDSTONE/SILTSTONE
 - SANDSTONE/SILTSTONE
 - SILTSTONE/SANDSTONE
 - MUDSTONE
 - Possible Fault

The information displayed here is to be used in conjunction with AGP21065_03 Report on the Geophysical Investigation at Spink Quarry, Co. Laois for Lagan, APEX Geophysics Ltd. 6th August 2021



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PROJECT: SPINK QUARRY, CO. LAOIS
GEOPHYSICAL SURVEY

CLIENT: LAGAN GROUP

DRAWING NO: AGP21065_R3

SCALE: AS INDICATED @ A4

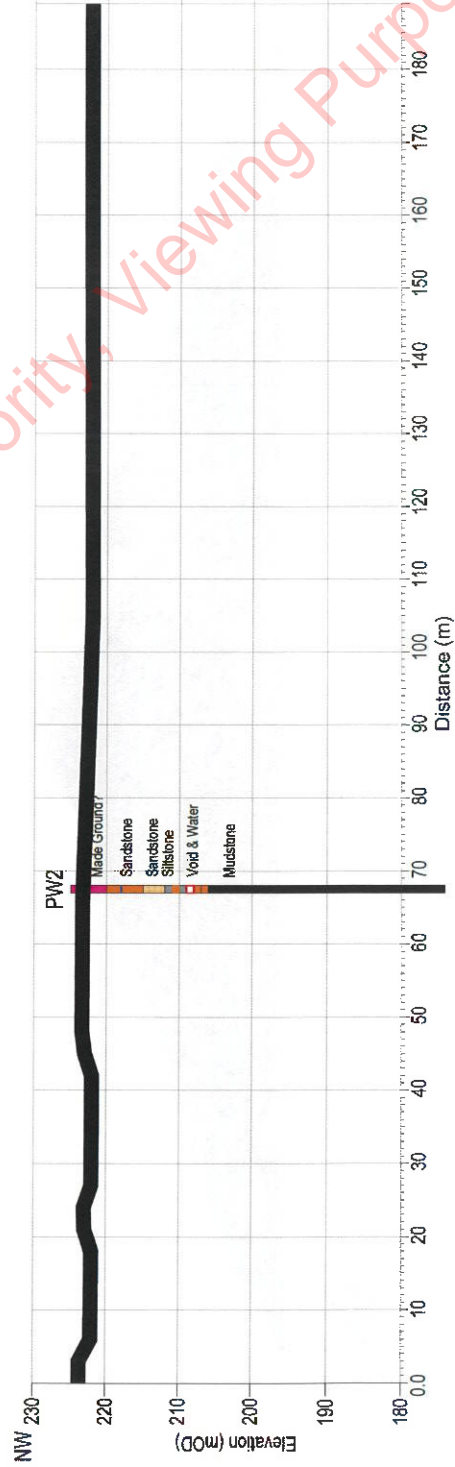
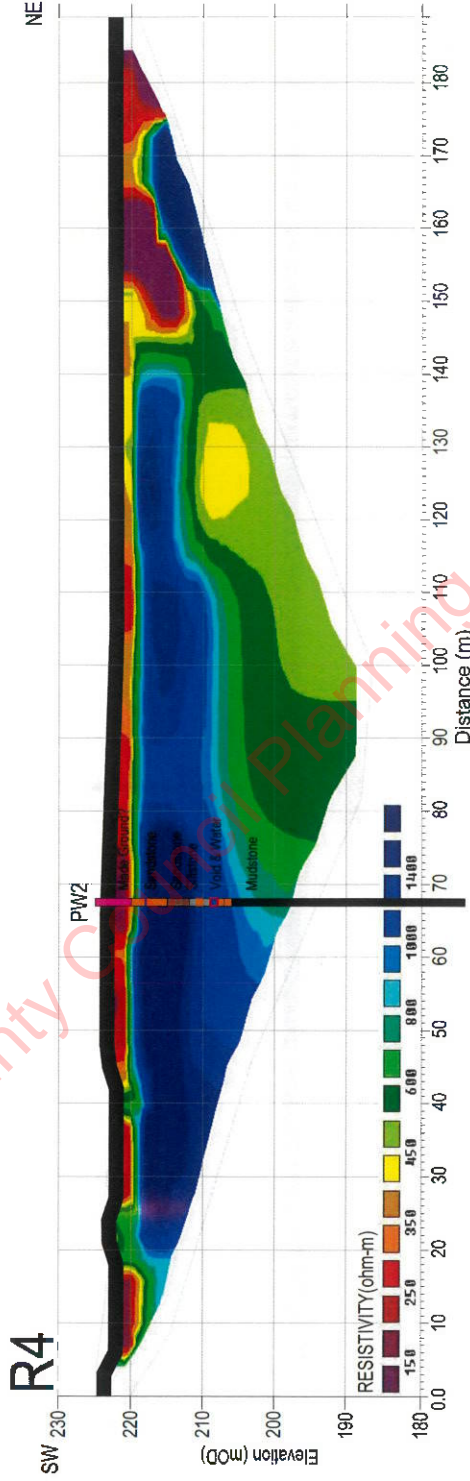
DATE: 29-06-2021

Version	Date	Drawn By	Checked
01	14-05-2021	YCC	POC
02	03-06-2021	YCC	POC
03	29-06-2021	YCC	

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RESULTS & INTERPRETATION - R4

SCALE 1:1000



LEGEND:

	Made Ground and/or Gravely SILT/CLAY
	Fractured ROCK
	Fractured SANDSTONE/SILTSTONE
	SANDSTONE/SILTSTONE
	SILTSTONE/SANDSTONE
	MUDSTONE
	Possible Fault

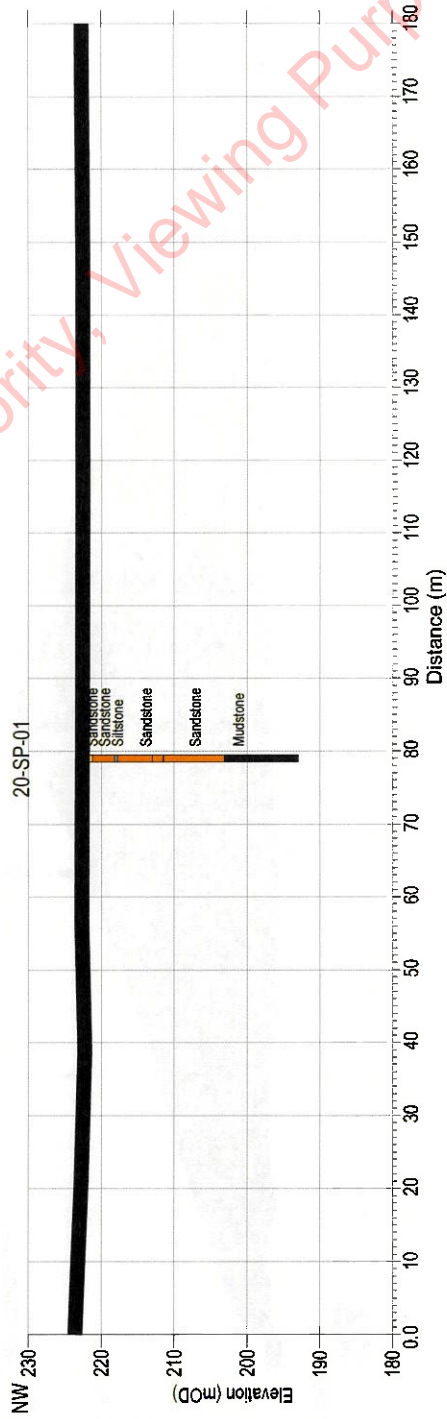
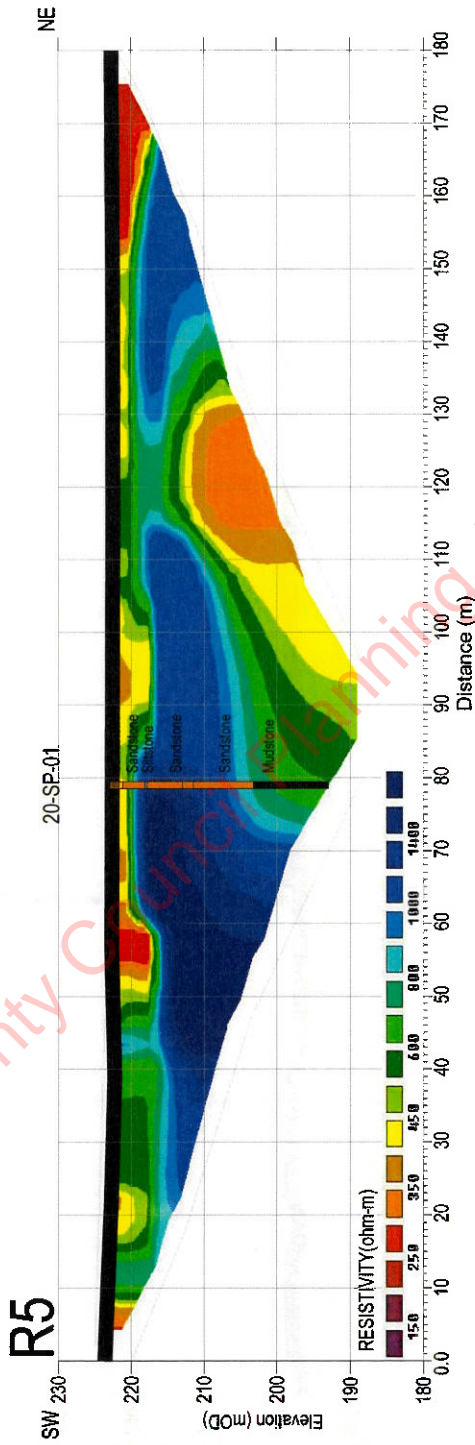
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PROJECT:	SPINK QUARRY, CO. LAOIS		
CLIENT:	LAGAN GROUP		
DRAWING NO.:	AGP21065_R4		
SCALE:	AS INDICATED @ A4		
DATE:	29-06-2021		
Version:	Date:	Drawn By:	Checked:
01	14-05-2021	YOC	POC
03	29-06-2021	YOC	

RESULTS & INTERPRETATION - R5
SCALE 1:1000



- LEGEND:**
- Made Ground and/or Gravelly SILT/CLAY
 - Fractured ROCK
 - Fractured SANDSTONE/SILTSTONE
 - SANDSTONE/SILTSTONE
 - SILTSTONE/SANDSTONE
 - MUDSTONE
 - Possible Fault

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PROJECT: SPINK QUARRY, CO. LAOIS
GEOPHYSICAL SURVEY

CLIENT: LAGAN GROUP

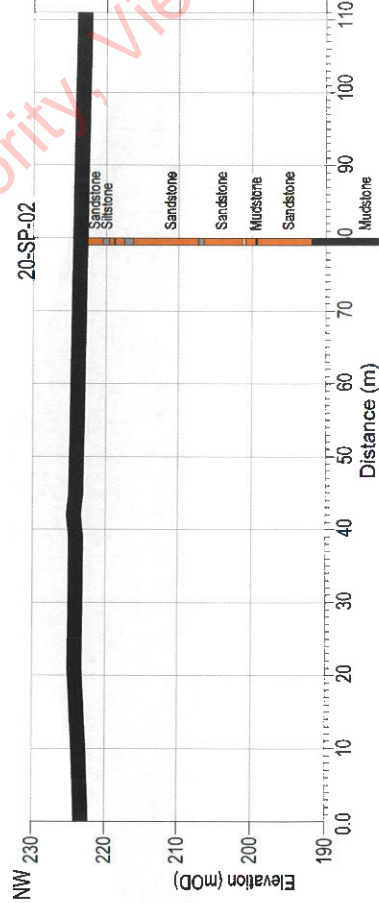
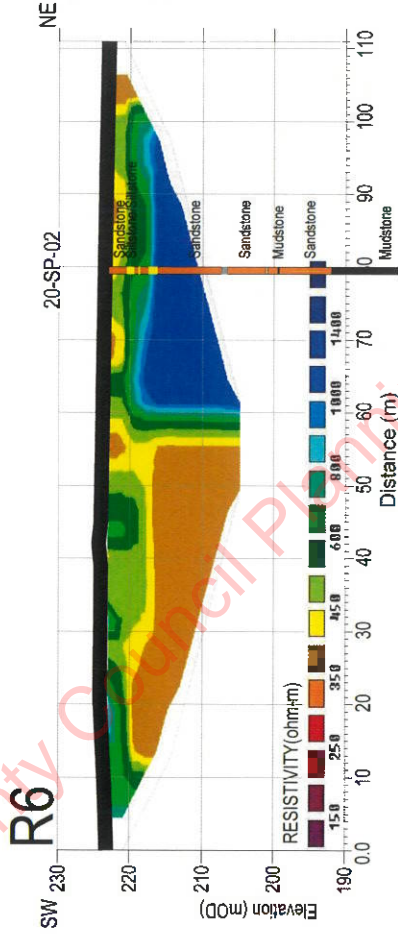
DRAWING NO: AGP21065_R5

SCALE: AS INDICATED @ A4

DATE: 29-06-2021

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01	14-06-2021	YOC	POC
03	29-06-2021	YOC	

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LEGEND:

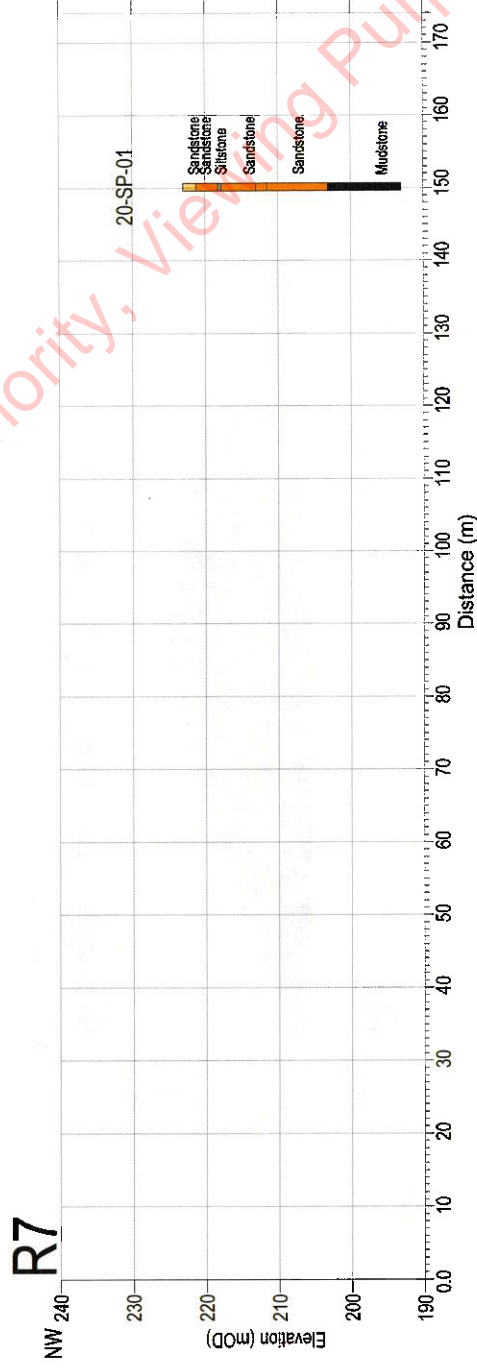
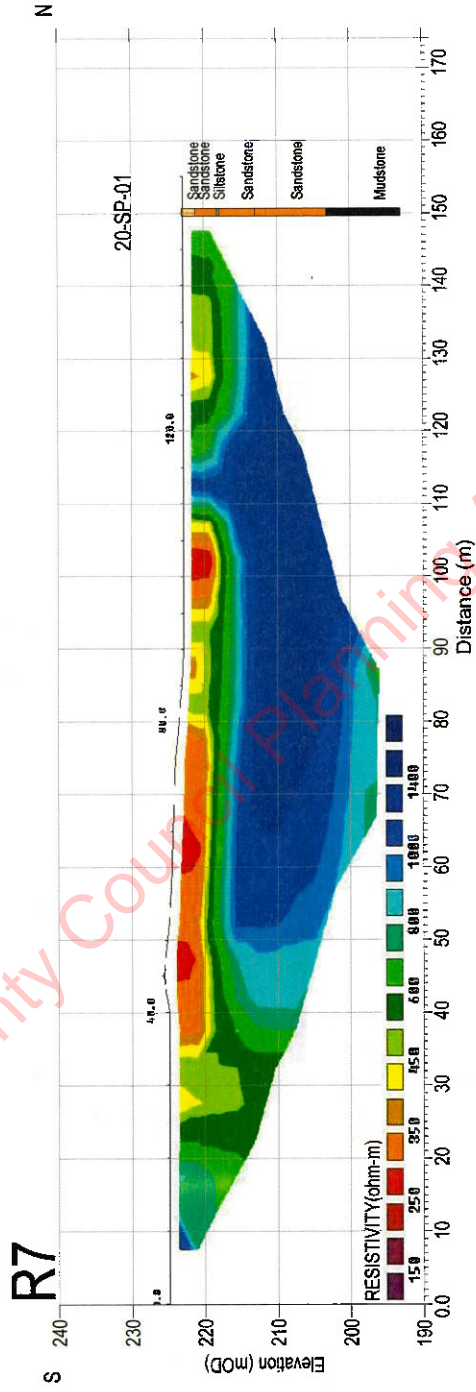
- Made Ground and/or Gravely SILT/CLAY
- Fractured ROCK
- SANDSTONE/SILTSTONE
- SILTSTONE/SANDSTONE
- MUDSTONE
- Possible Fault

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PROJECT:	SPINK QUARRY, CO. LAOIS GEOPHYSICAL SURVEY		
CLIENT:	LAGAN GROUP		
DRAWING NO:	AGP21065_R6		
SCALE:	AS INDICATED @ A4		
DATE:	29-06-2021		
Version:	Date:	Drawn By:	Checked:
01	14-05-2021	YOC	POC
02	03-06-2021	YOC	POC
03	29-06-2021	YOC	POC

RESULTS & INTERPRETATION - R7
SCALE 1:1000



- LEGEND:**
- Made Ground and/or Gravelly SILTCLAY
 - Fractured ROCK
 - Fractured SANDSTONE/SILTSTONE
 - SANDSTONE/SILTSTONE
 - SILTSTONE/SANDSTONE
 - MUDSTONE
 - Possible Fault

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PROJECT: SPINK QUARRY, CO. LAOIS
GEOPHYSICAL SURVEY

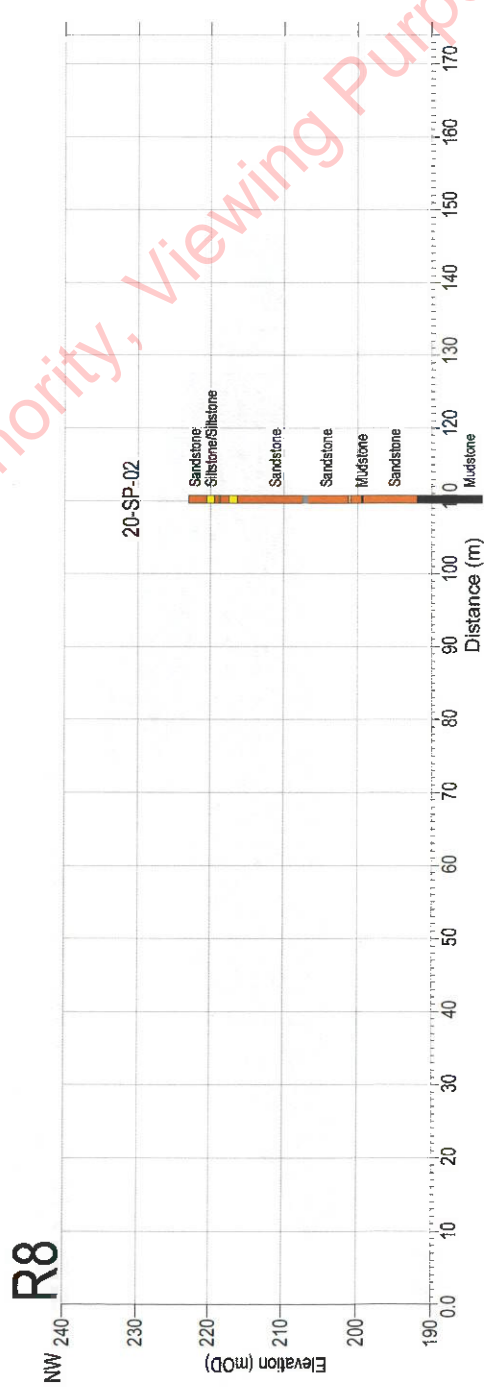
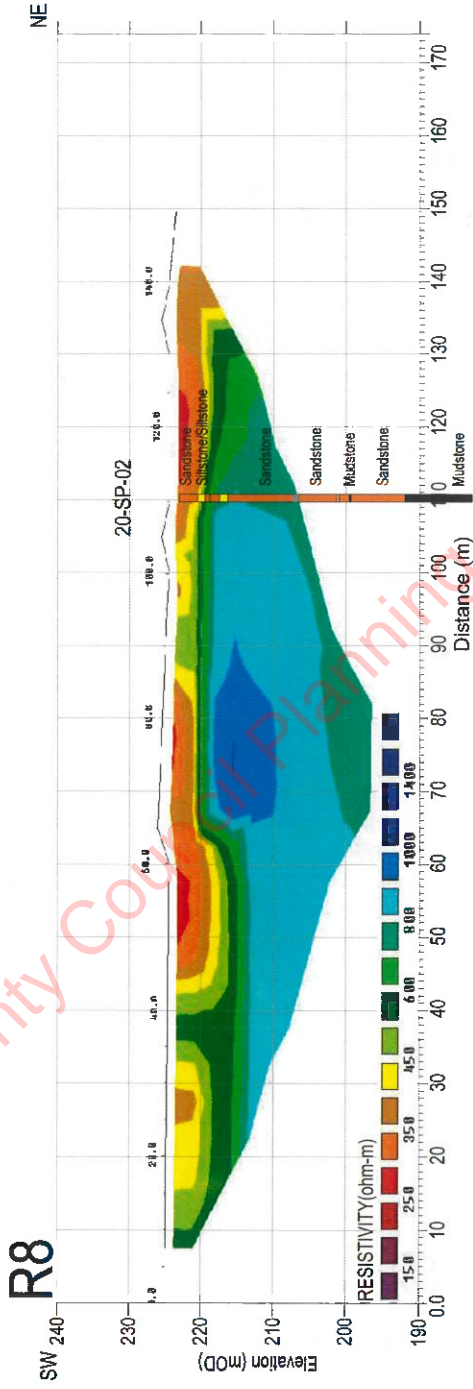
TITLE: LAGAN GROUP

DRAWING NO: AGP21065_R7

SCALE: AS INDICATED @ A4

DATE: 29-06-2021

Version:	Date:	Drawn By:	Checked:
01	03-06-2021	YCC	POC
03	28-06-2021	YCC	



LEGEND:

	Made Ground and/or Gravelly SILT/CLAY
	Fractured ROCK
	Fractured SANDSTONE/SILTSTONE
	SANDSTONE/SILTSTONE
	SILTSTONE/SANDSTONE
	MUDSTONE
	Possible Fault

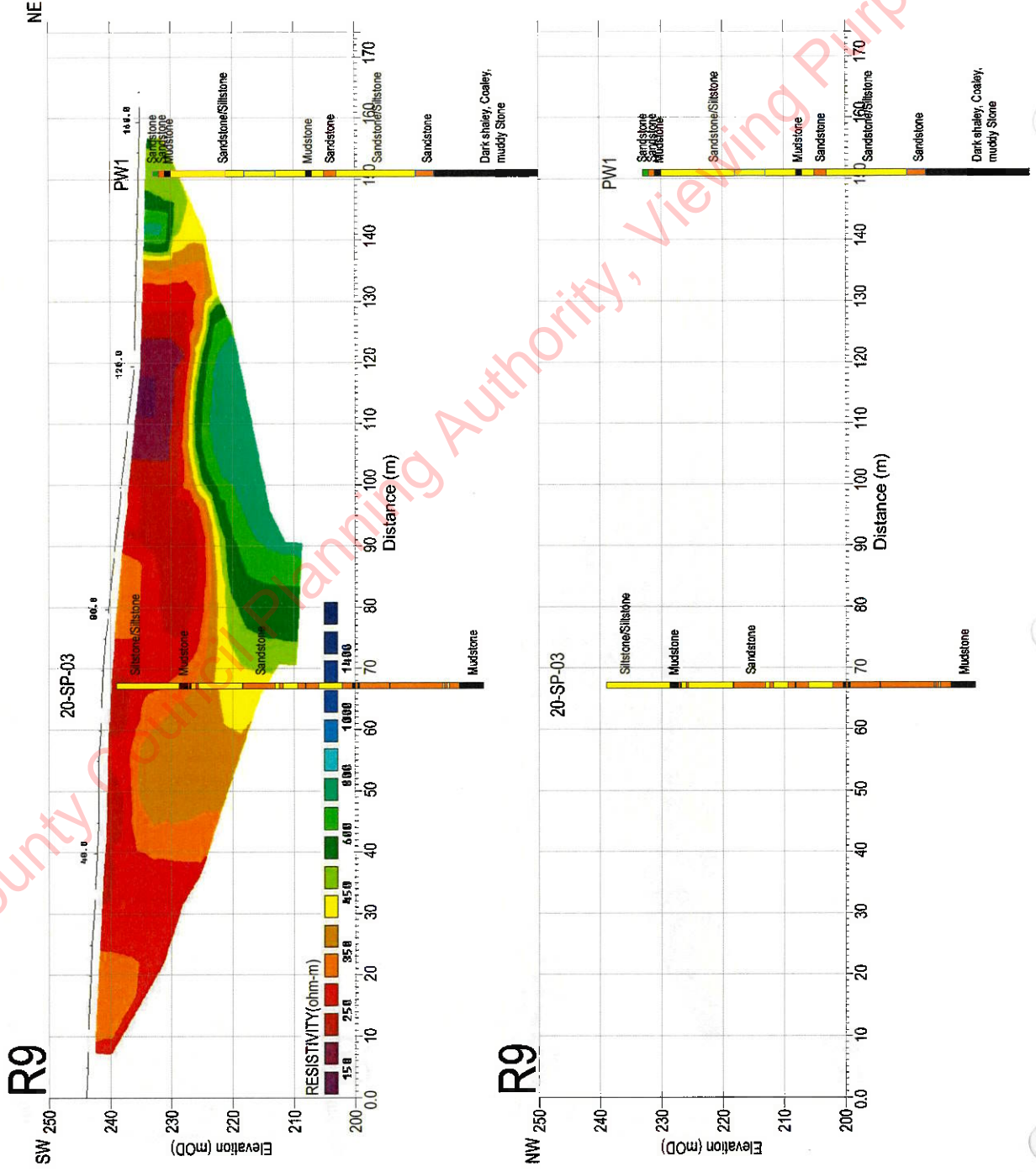
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PROJECT:	SPINK QUARRY CO. LAOIS GEOPHYSICAL SURVEY		
CLIENT:	LAGAN GROUP		
DRAWING NO:	AGP21065_R8		
SCALE:	AS INDICATED @ A4		
DATE:	29-06-2021		
Version:	Date:	Drawn By:	Checked:
01	03-06-2021	YOC	POC
03	29-06-2021	YOC	

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RESULTS & INTERPRETATION - R9
SCALE 1:1000



- LEGEND:**
- Made Ground and/or Gravelly SILT/CLAY
 - Fractured ROCK
 - SANDSTONE/SILTSTONE
 - SILTSTONE/SANDSTONE
 - MUDSTONE
 - Possible Fault

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PROJECT:	SPINK QUARRY, CO. LAOIS GEOPHYSICAL SURVEY		
CLIENT:	LAGAN GROUP		
ORDERING NO:	AGP21065_R9		
SCALE:	AS INDICATED @ A4		
DATE:	29-06-2021		
Version:	01	Drawn By:	Checked:
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		YOC	YOC

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