

SIRIUS MINERALS PLC - DISCHARGE OF PLANNING CONDITIONS FOR PLANNING PERMISSION NYM/2014/0676/MEIA (AS VARIED BY NYM/2017/0505/MEIA), NORTH YORKSHIRE POLYHALITE PROJECT

CONDITION	NYMNPA 47
REPORT	GROUNDWATER MANAGEMENT SCHEME (NYMNPA 47 – PHASE 5)
SITE	PHASE 5 DEVELOPMENT WORKS AT WOODSMITH MINE, NORTH YORKSHIRE
DOCUMENT NUMBER	40-FWS-WS-70-WM-PL-0015 Rev 2

1433DevOR388 Rev 2/May 2018

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NYMNPA
 25/05/2018

PROJECT NUMBER	1433	
PROJECT TITLE	North Yorkshire Polyhalite Project	
CLIENT	Sirius Minerals Plc Resolution House Lake View Scarborough YO11 3ZB	
REPORT TITLE	Groundwater Management Scheme (NYMNPA 47 – Phase 5)	
REPORT REFERENCE	1433DevOR388 Rev 2	
DOCUMENT NUMBER	40-FWS-WS-70-WM-PL-0015 Rev 2	
REVISION	Date	Approved
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GROUNDWATER MANAGEMENT SCHEME (NYMNP 47 – PHASE 5)

1 INTRODUCTION

1.1 General Background

This document has been prepared on behalf of Sirius Minerals Plc (Sirius Minerals) and provides the Groundwater Management Scheme for the Phase 5 Works at Woodsmith Mine as required to discharge Condition 47 of the North York Moors National Park (NYMNP) planning permission NYM/2014/0676/MEIA (as varied by NYM/2017/0505/MEIA).

1.2 Phase 5 Works

The scope of the Phase 5 Works will include:-

- Construction of Service Shaft foreshaft chamber to a depth of 168.7m AOD.
- Construction of Service Shaft permanent winder foundations to a depth of 197.17m AOD.
- Construction of Service Shaft permanent winder basement to a depth of 194.17m AOD.
- Construction of Service Shaft permanent building foundations to 202.2m AOD.
- Dewatering of Service Shaft foreshaft and platform to facilitate excavations.
- Excavation and construction of a working platform area on the western edge of the Production Shaft platform, with an AOD of 203.7m.
- Stockpiling of extractive material for re-use.

1.3 Compliance with Conditions

Table 1 sets out the wording of Planning Condition 47 to Planning Permission NYM/2014/0676/MEIA (as varied by NYM/2017/0505/MEIA) and details where the relevant material is presented in the report to comply with this condition:-

Table 1 - Summary of Planning Condition 47 and where Relevant Details are provided in the Report

NYMNP Condition 47	Compliance with Condition 47
Following the approval of the Revised Hydro-Geological Risk Assessment but prior to the commencement of development, a Groundwater Management Scheme (covering construction, operation and post-operation phases), shall be submitted to and approved in writing by the Local Planning Authority in consultation with the Environment Agency.	This document 1433DevOR388/May 2018.
The Scheme shall include technical drawings detailing the conceptualised hydrogeology with the final detailed designs of the proposed mitigation measures outlined in the Environmental Statement and in accordance with the details in the York Potash Project: Habitats Regulations Assessment prepared by Amec Foster Wheeler dated June 2015 with document reference 35190CGos064R, and the final design details of the lining systems for the proposed shaft.	Final designs, technical details, a conceptualised hydrogeological cross section, plans of the mitigation measures, and details of the compliance monitoring and reporting to validate their implementation for the Phase 5 Groundwater Management Scheme are provided in Section 2.
Development shall thereafter proceed only in strict accordance with the approved Scheme and a timetable to be included within it.	The timetable for implementing the Phase 5 Works Groundwater Management Scheme is presented in Section 3.

2 GROUNDWATER MANAGEMENT MEASURES – PHASE 5 WORKS

2.1 General

The Phase 5 Works will include the following groundwater management measures:-

- Dewatering of the Service Shaft Platform utilising the well array to maintain groundwater levels below the base of excavations for the Winder foundations, basement and shaft capping beam construction.
- Localised dewatering by sump pumping to maintain the excavations dry to the Winder basement area and to remove water trapped within the diaphragm wall to the Service Shaft Chamber.
- Installation of a low permeable enhanced geological barrier, where necessary, beneath the extension to the Production Shaft Platform.
- Realignment of the concrete canvas drainage ditch, to facilitate extension to the Production Shaft Platform.

To demonstrate the effectiveness of the groundwater management measures adopted during the Phase 5 Works, the ground and surface water monitoring scheme and associated remedial action plan will be implemented, as detailed in the Hydrogeological Risk Assessment (NYMNPA 46 – PHASE 5) (Ref 1).

2.2 Temporary Well Dewatering

2.2.1 General

Temporary dewatering will continue to be undertaken from the array of pumping wells installed around the Service Shaft Platform (Ref 2) to facilitate excavation of the winder basement, foundations and diaphragm wall capping beam, as illustrated in Drawings 1433DevOR347, 348 and 349. This pumping will be used to maintain groundwater below the target levels detailed below.

Table 2 - Summary of Target Groundwater Dewatering Levels

Structure	Platform Level (m AOD)	Seasonal High Water Table (m AOD)	Target Groundwater level
Winder foundations	203.17	199.8	196m AOD
Winder basement and lower capping beam	203.17	199.8	193 m AOD

2.2.2 Operational Management

Groundwater level monitoring will be carried out of the wells listed in Table 3, as shown in Drawing 1433devOR350, supplemented with monitoring of the dewatering well array and by visual inspection for groundwater seepages within the excavation areas. This monitoring will be undertaken to evaluate when supplementary sump pumping is required to maintain the

excavations dry. Trigger Control values are proposed to indicate when dewatering should be implemented to maintain the excavations dry.

Table 3 - Summary of Construction Phase Monitoring Wells

Shaft Location	Temporary Monitoring Well	Control Trigger Value (m bspl) [m AOD]
Winder Foundation and Basement	501, MW06 and MW10	(7m bspl) [196 m AOD]

Groundwater generated from dewatering will be pumped to a settlement tank at surface level to remove particulates and, where necessary, balance the pH before being passed through an oil/water interceptor prior to discharge to the surface water drainage system, under the same methodology as used in Phase 4a (Ref 3).

2.2.3 Documentation and Reporting

The Contractor will be responsible for maintaining daily records of the dewatering operations and of flow rates discharged from the system to surface water drainage.

2.3 Temporary Sump Dewatering

2.3.1 General

Temporary sump dewatering will be undertaken, where necessary, during excavation of the winder basement, foundations, capping beam and shaft chamber to maintain the groundwater table below the target levels presented in Table 2.

2.3.2 Operational Management

During construction, sumps will be excavated to facilitate groundwater pumping. Where necessary, drainage channels will be cut into the floor of the excavations to promote drainage towards the sump. Groundwater generated from these supplementary dewatering works will be pumped to a settlement tank at surface level as detailed in Section 2.2.2.

2.3.3 Documentation and Reporting

The Contractor will be responsible for maintaining daily records of the dewatering operations and of flow rates discharged from the system to surface water drainage.

2.4 Shaft Platform Extension Enhanced Geological Barrier

2.4.1 General

The western section to the Production Shaft Platform is to be extended which will entail excavation into the superficial deposits and bedrock. To maintain a low permeable barrier layer beneath this platform extension, a groundwater separation layer will be provided by tying in an

enhanced geological barrier into the existing natural clay geological barrier, as detailed in the Addendum to Groundwater Management Scheme for Phase 2 Site Preparatory Works (Ref 4).

2.4.2 Operational Management

The enhanced geological barrier will be installed where the insitu natural clay cover, overlying the Moor Grit sandstone, is less than 0.5m thick. Design details for installing the enhanced geological barrier will be as presented in Addendum to Groundwater Management Scheme for Phase 2 Site Preparatory Works (Ref 4).

2.4.3 Documentation and Reporting

The Contractor will prepare records of the enhanced geological barrier lining works installed in accordance Addendum to Groundwater Management Scheme for Phase 2 Site Preparatory Works (Ref 4) and the Environmental Engineer will be responsible for compiling the final Liner Construction Validation Report.

2.5 Shaft Platform Extension Realignment of the Lined Surface Water Drainage Ditch

2.5.1 General

To extend the western section to the Production Shaft Platform, the existing perimeter concrete canvas lined drainage ditch, completed as part of the Phase 3 Works (Ref 2), will be relocated to the west.

2.5.2 Operational Management

Construction of this lined ditch will be undertaken as detailed in Groundwater Management Scheme for the Phase 3 Works at Woodsmith Mine, North Yorkshire (Ref 5).

2.5.3 Documentation and Reporting

The Contractor will keep and maintain records of the concrete canvas lined surface water drainage ditch in accordance with the Groundwater Management Scheme for the Phase 3 Works at Woodsmith Mine, North Yorkshire (Ref 5) and the Environmental Engineer will be responsible for compiling the final Liner Construction Validation Report.

3 TIMETABLE FOR IMPLEMENTING THE PHASE 5 WORKS GROUNDWATER MANAGEMENT SCHEME

The timetable for undertaking the Phase 5 Works, including the associated groundwater management scheme, is July to December 2018.

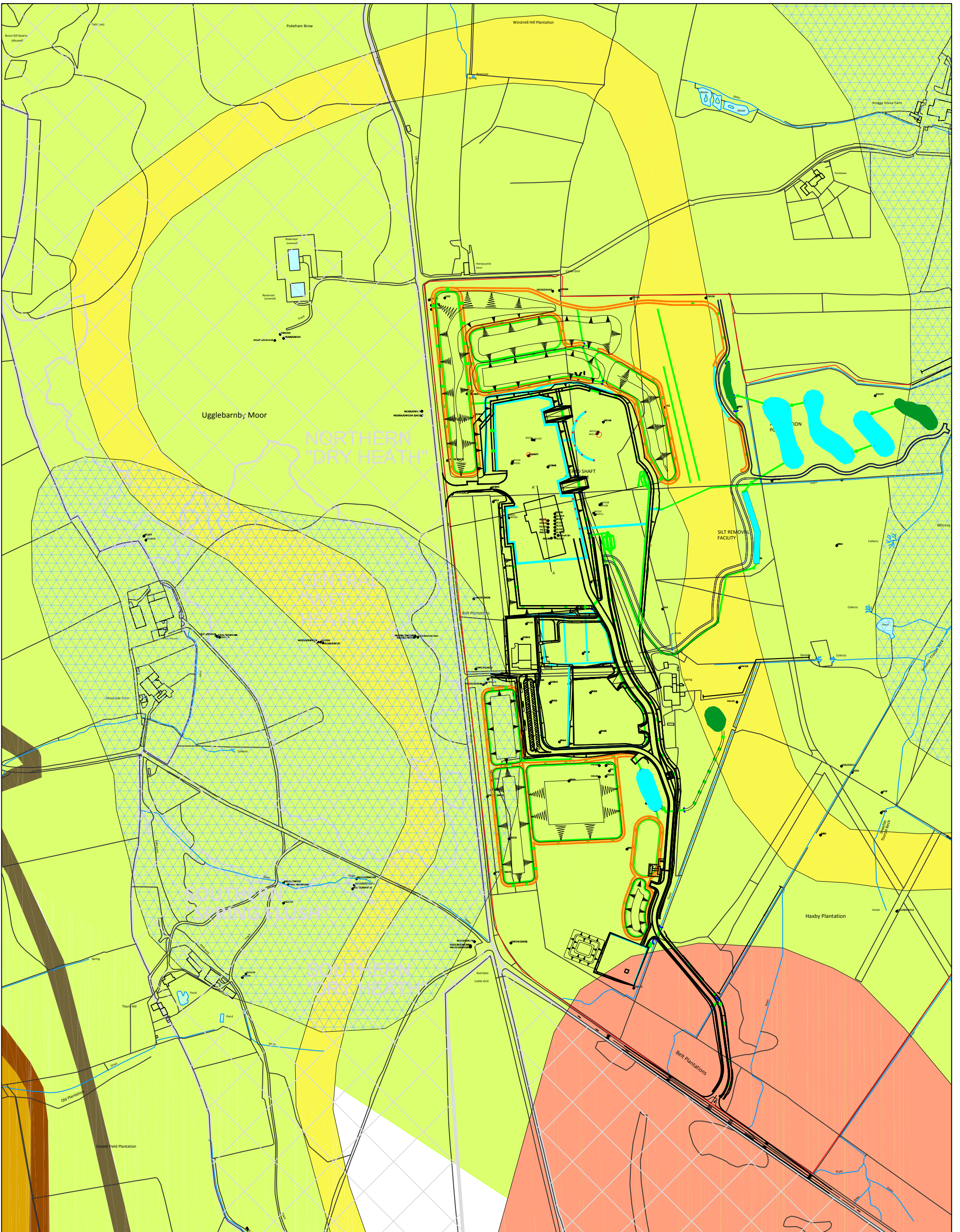
R IZATT-LOWRY
DIRECTOR

4 REFERENCES

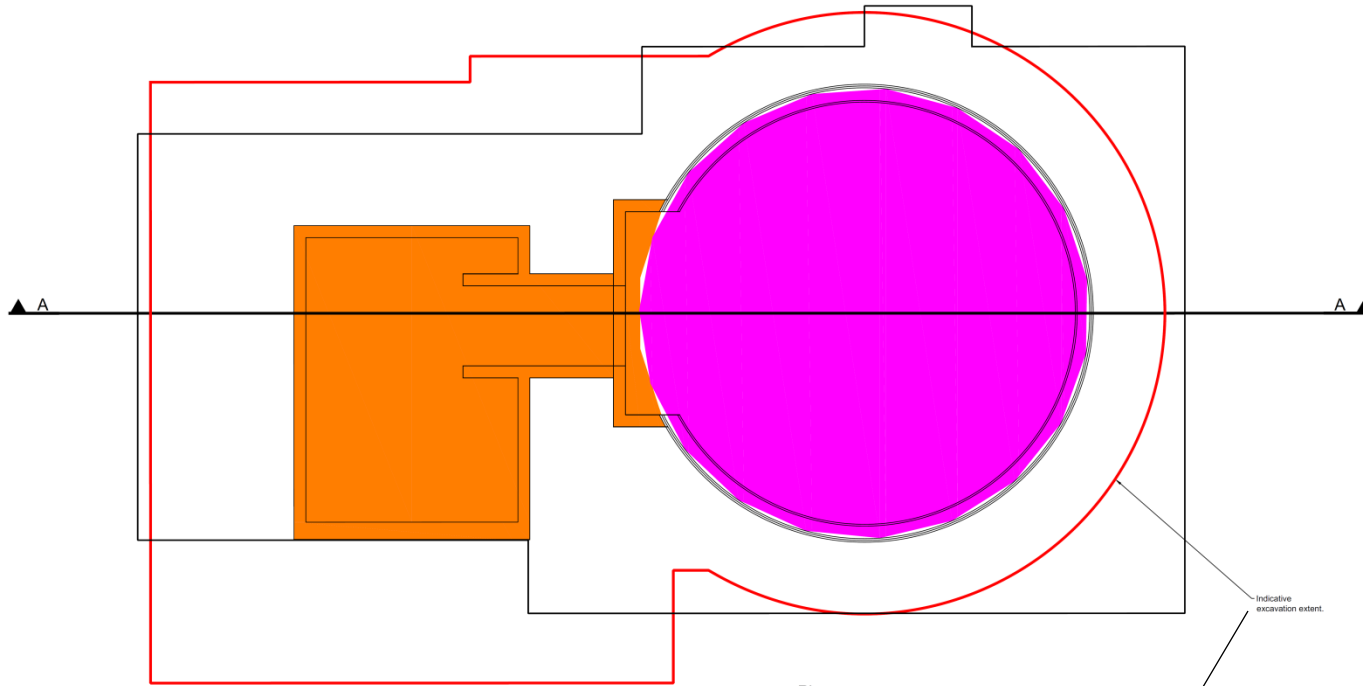
- 1 FWS Consultants Ltd, May 2017. Hydrogeological Risk Assessment (NYMNPA 46 – PHASE 5) (1433DevOR385).
- 2 FWS Consultants Ltd, March 2018. Phases 2 and 3 Construction Validation of the Groundwater Management Scheme (1433DevOR272).
- 3 FWS Consultants Ltd, May 2017. Groundwater Management Scheme (NYMNPA 47 – Phase 4a). Doc. Ref. No. 1433DevOR381.
- 4 FWS Consultants Ltd, May 2017. Addendum to Groundwater Management Scheme for the Phase 2 Works at Woodsmith Mine, North Yorkshire (1433DevOR214).
- 5 FWS Consultants Ltd, March 2017. Groundwater Management Scheme for the Phase 3 Works at Woodsmith Mine, North Yorkshire (1433DevOR178).

APPENDIX 1

DRAWINGS

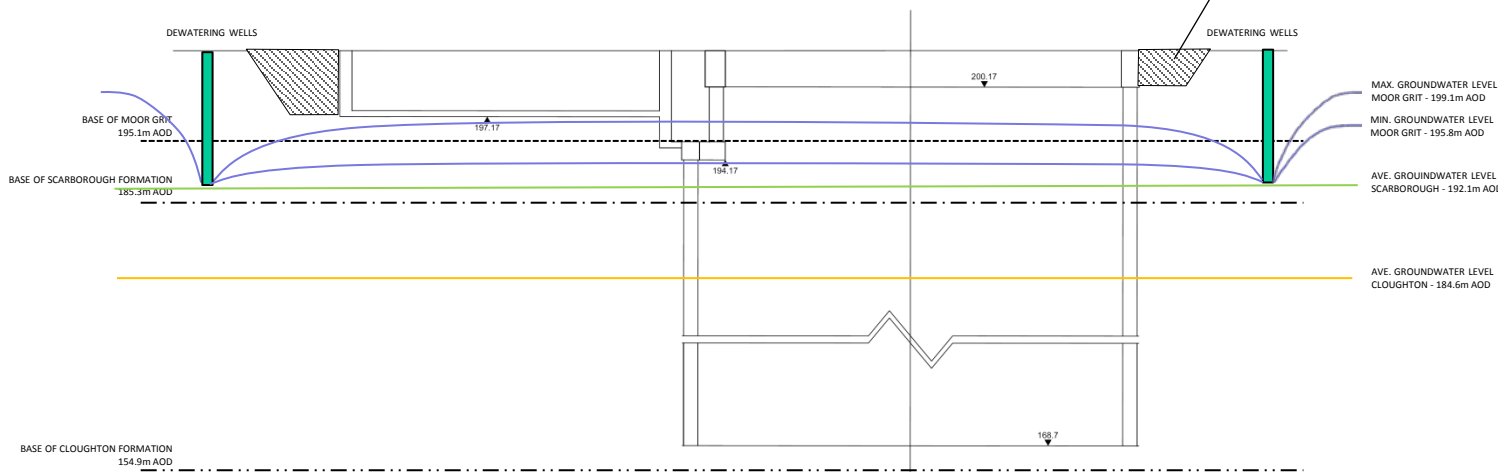


<p>NOTES / KEY</p> <p>SITE OWNERSHIP BOUNDARY ———</p> <p>NYM SAC [Pattern]</p> <p>SURFACE WATER ———</p> <p>BOREHOLES ⊕ GCBH01</p> <p>HYDROGEOLOGICAL RECEPTORS ⊕ MF2</p> <p>LINE OF CROSS SECTION ———</p> <p>CROSS SECTION A-A' and B-B' DRAWING 1433DevOD244</p> <p>CROSS SECTION A-A' DIAPHRAGM WALL DRAWING 1433DevOD268</p> <p>CROSS SECTION C-C' DRAWING 1433DevOD266</p> <p>CROSS SECTION D-D' DRAWING 1433DevOD267</p>	<p>GEOLOGY</p> <p>GLACIAL TILL</p> <p>LONG NAB</p> <p>MOOR GRIT</p> <p>SCARBOROUGH FORMATION</p> <p>CLOUGHTON & SALTWICK FORMATION</p> <p>ELLER BECK FORMATION</p> <p>DOGGER FORMATION</p> <p>WHITBY MUDSTONE</p>	<p>DRAWING TITLE</p> <p>GEOLOGICAL MAP AND LINE OF CROSS SECTIONS</p> <p>PROJECT TITLE</p> <p>NORTH YORKSHIRE POLYHALITE PROJECT</p>	<p>CLIENT</p> <p>SIRIUS MINERALS PLC</p> <p>STATUS</p> <p>FINAL</p> <p>DRAWN BY</p> <p>ML</p> <p>SCALE</p> <p>1:5,000@A3/1:2,500@A1</p> <p>PROJECT NUMBER</p> <p>1433Dev</p> <p>DATE</p> <p>May 2018</p> <p>DRG. No.</p> <p>1433DevOD347</p>	<p>FWS Geological & Geo-Environmental Consultants</p> <p>Merrington House Merrington Lane Industrial Estate Spennymoor County Durham DL16 7UT</p>
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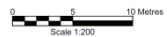


Plan

Indicative excavation extent.



Section A-A



NOTES / KEY

CLIENT

SIRIUS MINERALS PLC

DRAWING TITLE

SCHEMATIC HYDROGEOLOGICAL SECTION
(NORTH TO SOUTH) THROUGH SERVICE SHAFT
SHOWING GROUNDWATER MANAGEMENT

PROJECT TITLE

YORK POTASH PROJECT

STATUS

FINAL

PROJECT NUMBER

1433Dev

DRAWN BY

ML

DATE

May 2018

SCALE

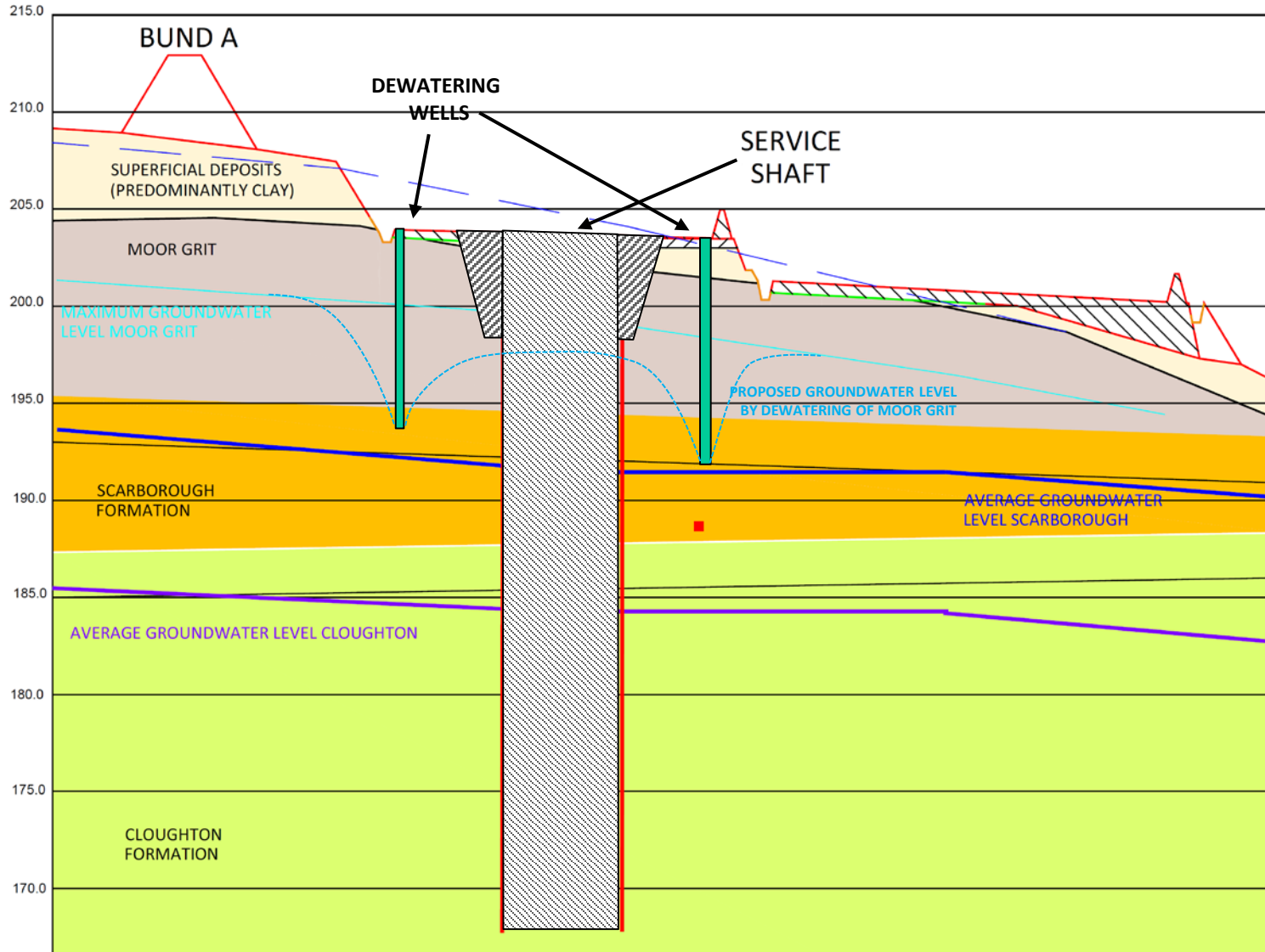
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DRG. No.

1433DevOD348

B

B'



NOTES / KEY

- GEOLOGY**
- EXISTING GRANULAR PLATFORM CONSTRUCTION
 - NEW GRANULAR PLATFORM CONSTRUCTION
 - COHESIVE SUPERFICIAL DEPOSITS
 - MOOR GRIT
 - SCARBOROUGH FORMATION
 - CLOUGHTON FORMATION

CLIENT

SIRIUS MINERALS PLC

DRAWING TITLE

SCHEMATIC HYDROGEOLOGICAL SECTION (EAST TO WEST) THROUGH SERVICE SHAFT SHOWING DEWATERING GROUNDWATER MANAGEMENT

PROJECT TITLE

YORK POTASH PROJECT

STATUS

FINAL

PROJECT NUMBER

1433Dev

DRAWN BY

ML

DATE

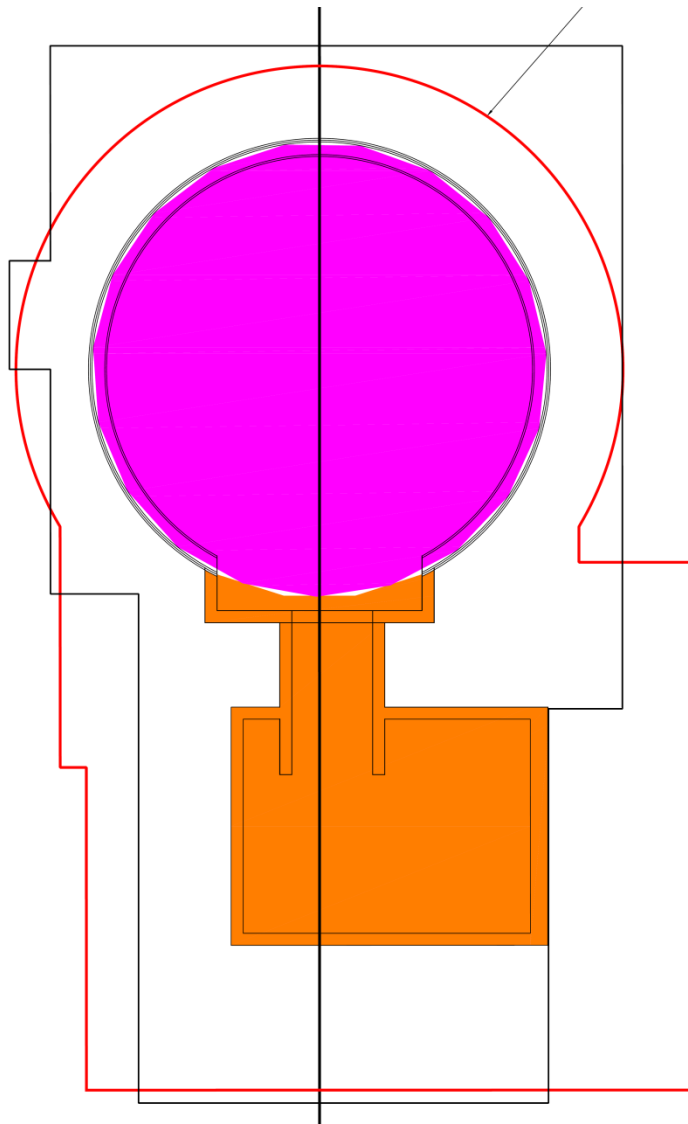
May 2018

SCALE

NOT TO SCALE

DRG. No.

1433DevOD349



DW31

DW30
BH501

DW29

DW28

DW27

DW26

DW25

MW10

DW24

DW23

DW16

MW6

DW17

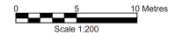
DW18

DW19

DW20

DW21

DW22



NOTES / KEY

CLIENT

SIRIUS MINERALS PLC

DRAWING TITLE

DEWATERING AND MONITORING WELL LAYOUT – SERVICE SHAFT

PROJECT TITLE

YORK POTASH PROJECT

STATUS

FINAL

DRAWN BY

ML

SCALE

AS SHOWN

PROJECT NUMBER

1433Dev

DATE

May 2018

DRG. No.

1433DevOD350