

**City of York, North York Moors National Park and North Yorkshire County Council
Minerals and Waste Joint Plan ("the Plan") Examination**

**Briefing Note to Inspector Elizabeth Ord, LLB (Hons), LL.M, MA, Dip TUS and to the
Joint Planning Authorities (respectively "the Inspector" and "the Planning
Authorities")**

Participant: INEOS Upstream Limited ("INEOS")

**Subject: Examination Matter 3: Transport, Infrastructure and Safeguarding -
Safeguarding**

**Hearing Session 13th April 2018 - Agenda Item 2 - Potash Safeguarding (including
buffer and interaction with hydrocarbons)**

1. Introduction

- 1.1 Following on from the hearing session held on 24th March 2018 to discuss the potash safeguarding policies in the Plan, the Planning Authorities issued a Schedule of Additional Changes and Draft Main Modifications ("the Schedule").
- 1.2 The draft Main Modifications ("Draft MMs") set out the proposed changes to a policy or its supporting text which, if adopted, would amount to "an influence on the Policy".
- 1.3 Three separate Draft MMs (referred to as 2A, 2B and 2C below) involving changes to the policy wording (the first (MM 64) is shown in the Schedule as involving three matters, the second (MM 65) two and the third (MM 66) one) have been proposed in relation to Safeguarding Policies SO1 and SO2. These six matters are set out below under the heading of the relevant Draft MM in the same order as they appear in the Schedule and are numbered 1-6 for ease of reference.
- 1.4 This briefing note has been prepared on behalf of INEOS and is intended to provide the Inspector and the Planning Authorities with an update on the status of progress made between INEOS and the owner of the safeguarded potash resource, Sirius Minerals Limited ("Sirius") regarding the six matters referred to in each of the three Draft MMs.
- 1.5 Where changes to the wording of the safeguarding Policies are proposed by INEOS this note sets out, under the heading "Existing Wording", the existing wording of the relevant Policy as shown in the Publication Draft Core Document 17. The replacement wording which INEOS would ask the Inspector and the Planning Authorities to consider is shown under the heading "Proposed Replacement Wording".
- 1.6 The abbreviation "PEDL" refers to an onshore petroleum exploration and development licence issued by the UK Government that allows a company to pursue a range of hydrocarbon exploration activities, subject to all necessary drilling/development consents and planning permissions being in place.
- 1.7 INEOS' draft statement of uncommon/common ground is set out in section 2A. 2 below.
- 1.8 Attached to this briefing note is a three part appendix. Part 1 is a copy of a plan produced by Sirius which shows the red line boundary of the area that it now proposes should show the extent of the potash safeguarding area. Part 2 is a copy of a plan produced by INEOS which overlays the red line boundary shown on the Sirius plan with the boundaries of the PEDL

areas in order to demonstrate the level of overlap. Part 3 is a copy of a technical paper produced by an INEOS geologist which explains how hydrocarbon development can be carried out in such a manner which would ensure that no significant adverse impact on the safeguarded potash resource would occur.

2. Draft Main Modifications

A. MM 64, page 149, Policy SO1 - Safeguarding Mineral Resource

Proposed Change: Revise Part 2) - Deep Mineral Resource (Requested by the Inspector)

- 1. INEOS and Sirius to meet as soon as possible to prepare a statement of common ground and/or statement of uncommon ground to be submitted to Inspector and the Planning Authorities; to consider a cautious approach; consider buffer zone and whether the right size and shape has been safeguarded; whole resource not to be safeguarded as not proportionate.**

UPDATE: Representative of INEOS and Sirius met in Leeds on 4th April to discuss the Draft MMs and the preparation of a statement of common ground. It had been hoped that agreement would be reached on the following points: (i) whether the proposed safeguarded area as shown on policies map No. 13 ("the Policies Map") is the right size and shape, (ii) the need or otherwise for, and the proper purpose of, a buffer zone, (iii) whether deep drilling as part of "sub-surface hydrocarbon development" can be carried out in such a way as to ensure that the safeguarded potash resource would be protected from sterilisation, and (iv) the need for changes to be made to the wording of the Policies and/or the wording of the Policy justification set out in paragraphs 8.22-8.24.

Sirius' representatives made it clear at the meeting that Sirius would not be persuaded that drilling operations could be carried out in such a way as to ensure that the potash resource would be protected from potential sterilisation. (INEOS regard this assertion as somewhat disingenuous given that the method of drilling operation carried out by onshore hydrocarbon operators to explore the commercial prospectivity of the licensed resource is identical to the drilling method which Sirius will employ to establish the commercial prospectivity of their potash resource.)

Sirius did, however, agree at the meeting that there is little practical relevance for the provision of a buffer zone around a safeguarding area if both the relevant area of protection and the buffer zone were to be subject to the same policy treatment. If the appropriate area of protection was deemed to be needed to include the area currently shown designated as a buffer zone on the Policies Map then the Policies Map should be changed so that it showed the entire extent of the increased area shaded the same colour thereby making it clear that is the potash resource located within that entire area that should be safeguarded.

Having agreed how the deep minerals safeguarding area should be presented on the Policies Map, Sirius' representatives then advised the meeting that, even with the 2 km buffer zone included, the current areas shown on the Policies Map were not large enough to provide mining for more than 50 years - when it appeared to have been accepted by the Inspector and the Planning Authorities at the hearing session on 24th March that an amount of potash resource equivalent to 200 years of mining operations should be protected.

(It will be noted that this advice concerning the amount of resource that is currently proposed to be safeguarded does not accord with the response which Sirius' representatives gave to the Inspector at the 24th March hearing session when in reply to Question 115 ("Are appropriate areas safeguarded for all economically significant minerals and those that have reasonable prospects of becoming economically viable in the future?") the advice given was that the area shaded pink on the Policies

Map would provide a 100 years' reserve and a 200 years' reserve if the area covered by the proposed 2 km buffer zone (shown shaded light pink) were also to be added.)

In the light of that assessment Sirius would now be asking the Inspector and the Planning Authorities to significantly increase the extent of the surface area of the Plan caught by the safeguarding requirement so that it covered an area that in Sirius' view would be capable of delivering a 200 year supply.

The meeting ended with no agreement having been reached on:

(i) whether the proposed safeguarded area as shown on policies map No. 13 ("the Policies Map") is the right size and shape;

(ii) whether deep drilling as part of "sub-surface hydrocarbon development" can be carried out in such a way as to ensure that the safeguarded potash resource would be protected from sterilisation, and

(iii) the need for changes to be made to the wording of the Policies and/or the wording of the Policy justification set out in paragraphs 8.22-8.24.

Agreement did, however, appear to have been reached on the following point, namely that a 2km buffer zone served no practical purpose.

Following the meeting, a plan was produced by Sirius (and provided to INEOS) which purports to show the extent of the potash resource which Sirius would now seek to have safeguarded from hydrocarbon drilling operations in order to provide the equivalent of a 200 year operational supply. A copy of this plan is set out at Appendix Part 1 ("the Extended Safeguarding Area Plan").

To demonstrate the level of increased encroachment into the licensed PEDL areas that would result if either of these proposed areas of extension were to be accepted by the Planning Authorities, INEOS has produced a plan which overlays the location of the existing licensed PEDL areas onto the extended deep minerals safeguarding area as shown by the red line boundary on the Extended Safeguarded Area Plan. A copy of this overlay plan is set out at Appendix Part 2 ("the Overlay Plan").

If the deep minerals safeguarded area is extended to cover the full extent of the surface area shown by the redline boundary on the Extended Safeguarding Area Proposals Area Plan then the Overlay Plan demonstrates that the safeguarding requirement would impact on the ability of the operators licensed under PEDL 347, PEDL 343, PEDL PL77, PEDL 258 and PEDL 120 to obtain the planning permissions which it needs to explore for and produce hydrocarbons in accordance with their licence obligations to the UK Government ("the Potentially Affected PEDL Areas").

Sirius have asked INEOS for comments on their extension proposals. These are set out below in paragraphs 2 (i) - (iv) of this note.

2. Following receipt of the Statement of Common/Uncommon Ground, the Planning Authorities then to meet with the industry to discuss wording.

Draft STATEMENT OF UNCOMMON GROUND: As indicated, INEOS had hoped to reach agreement with Sirius on the matters referred to a (i) -(iv) in the first paragraph of the above UPDATE. However, that proved not to be the case. Dealing with each in turn and setting out INEOS comments on the issues raised:

(i) whether the proposed safeguarded area as shown on the Policies Map is the right size and shape

COMMENT: INEOS disagrees with Sirius' proposed extension of the safeguarding area as shown on the Extended Safeguarding Area Plan. INEOS agrees with the Planning Authorities that the area of indicative (the "economically significant" extent) and inferred (the "reasonable prospects of becoming economically viable in the future" extent) resource shown by the area shaded pink on the relevant Policies Map, which the Inspector was advised at the 24th March hearing session would provide a 100 year supply of potash, is the appropriate area to be safeguarded during the life of the Plan.

At paragraph 4.2.7 of its guidance concerning "Mineral Safeguarding in England (2011) the British Geological Survey ("BGS") advises mineral planning authorities that "in certain areas Mineral Safeguarding Areas covering resources that are not considered of any great national or regional importance or that occur extensively over the area of the Mineral Planning Authority could be reduced in size. Any reduction in the extent of a Mineral Safeguarding Area must be based on consistent and justifiable criteria in particular geological or, if necessary, economic considerations in a transparent and credible way. Specifically factors such as quality, quantity, importance and productivity may be considered to attempt to identify those parts of the resource that might have greater economic significance than other parts."

In INEOS' view the Planning Authorities have already provided justifiable geological and economic criteria for the potash Mineral Safeguarding Area not to cover the whole potash resource and be reduced in size to the area shown shade pink on the Policies Map. In their respective responses to questions 69 and 71 in the MIQs - Matter 1 Minerals -Potash, Polyhalite, Sylvanite and Salt (February 2018) the Planning Authorities advise inter alia that:

"Potash is one of many minerals listed in the NPPF (NEB01) as being of local and national importance, but it is not a scarce mineral in global terms and is produced across the world in many countries"

"The form of potash (polyhalite) to be mined in the Plan period is destined for export and there is therefore no domestic demand to justify allocation – in effect the polyhalite mines are not regarded as "potash sites of national importance". The recent permission for Sirius Minerals was considered to represent exceptional circumstances only in relation to its transformational economic benefit; both at regional and national level on account of its expected positive trade deficit benefits (see NPA Committee resolution – Appendix Part 1)". (INEOS' emphasis)

The clear conclusion to be drawn here is that potash is to be treated as a mineral of only local importance.

This advice needs to be contrasted with the terms of the Written Ministerial Statement, Shale Gas and Oil, dated 16 September 2015 which provided that:

"There is a national need to explore and develop our shale gas and oil resources in a safe and sustainable and timely way [...] This statement to Parliament should be taken into account in planning decisions and plan-making [...]Exploring and developing our shale gas and oil resources could potentially bring substantial benefits and help meet our objectives for secure energy supplies, economic growth and lower carbon emissions. (INEOS' emphasis)

Again in INEOS' submission the clear conclusion to be drawn is that in areas of potential development conflict between the two resources, the identified national need to explore and develop hydrocarbon resources will take precedence over the local need to safeguard potash.

To the extent, however, that Sirius' proposed extension of the potash safeguarding area as shown on the Overlay Plan is likely to make it more difficult for licensed PEDL operators to explore for and develop hydrocarbons in the Potentially Affected PEDL Areas, it should be disregarded.

By way of compromise, INEOS would be prepared, as they have made clear in correspondence, to accept the extension of the deep minerals safeguarded area to include the "2 km buffer zone" area that is currently shown shaded light pink on the Policies Map. This would involve the Policies Map being amended so that the area comprising the 2km buffer zone was also shown shaded pink.

However, the important point to note, as shown in the Overlay Plan, is that even that proposal, which in policy terms effectively reflects the position currently supported by the Planning Authorities, will still involve a level of overlap between the deep minerals safeguarded area and part of the area licensed under PEDL 343 owned by Third Energy UK Gas Limited ("Third Energy") and the whole of the area licensed under PEDL 258 owned by Egdon Resources plc ("Egdon").

In considering the revisions to the wording of Policy SO1 and SO2 that INEOS are proposing (see below), the Inspector and the Planning Authorities are asked to attach weight to the fact that the prospective shale area most affected by the overlap ie PEDL 343 was issued to its current owner, Third Energy, by the UK Government in 2015 under the 14th Onshore Oil and Gas Licensing Round.

As part of that process, and ahead of its implementation, the licensing programme was subjected to a strategic environmental assessment which took account of inter alia the potential impact of drilling operations on existing land uses and resources such as the potash (see DECC Strategic Environmental Assessment for Further Onshore Oil and Gas Licensing (Post Adoption Statement - June 2014)). In Section 4 in the "Guidance about the Environmental Aspects of Any Application - Landward" issued at the time applications for PEDLs under the 14th Licensing Round were being invited, it was made clear, too, to prospective applicants that they would be expected to "demonstrate their understanding of the environmental sensitivities and potential constraints within and immediately adjacent to the area of interest, and their awareness of the potential impacts that would have to be managed during the execution of a work programme".

This makes it clear that the operators who acquired PEDL interests in North Yorkshire in 2015 were fully aware of the need to consider the impact of drilling operations on the potash resource now owned by Sirius at Dove's Nest Farm. It also makes it clear that the UK Government was fully satisfied ahead of issuing the PEDLs at that time that the drilling operations could be conducted in such a way as to ensure that any potential constraint arising out of any overlap subsurface between a licensed prospective hydrocarbon area and an area containing a safeguarded mineral resource could be properly managed by the relevant interested parties and the regulators.

The timing of the dates of validation and final determination of the Dove's Nest Farm planning permission needs too, to be taken into account. The application was validated on 30th September 2014 with planning permission being issued on 19th October 2015.

Against that background, it is submitted by INEOS that for the Plan to be sound, it needs to have a safeguarding policy which addresses the issue of potential competing demands on these resources and recognises that in certain circumstances it may be entirely appropriate that the recognised national need for hydrocarbons takes precedence over the need to protect the entire extent of the safeguarded potash resource from potential sterilisation.

(ii) whether deep drilling as part of shale gas development can be carried out in such a way as to ensure that the safeguarded potash resource would be protected from sterilisation

COMMENT: Ahead of attending the meeting with Sirius' representative on 4th April, geologists and drilling engineers from INEOS prepared a technical paper which demonstrated how hydrocarbon drilling would be carried out in such a way as to ensure that the safeguarded potash resource would be protected from the risk of fugitive groundwater or gas emissions. A copy of this technical paper is set out at Appendix Part 3 of this note.

The paper makes the important point that, given the fact that the mining method proposed by Sirius involves the use of "pillars" to support the excavation of potash from the "rooms" created by the pillars, the steel casing which would be placed and cemented in around any borehole (thereby providing an impermeable barrier) that might have to be drilled through any potash strata would, together with the amount of potash that would be left in place as a column around it, effectively provide a supporting "pillar" that would have been needed to be provided as part of the potash mining process in any event.

It also makes the point, too, that at subsurface much of the thickness distribution (and thus economic viability) of the potash that Sirius is now looking to have safeguarded, particularly in the Vale of Pickering, is highly conjectural for the simple reason that the exploratory drilling that would be needed to establish that thickness distribution has not yet been carried out. Sirius may well, therefore, be asking the Planning Authorities to safeguard a resource that is unviable to mine.

(INEOS' representatives at the meeting held on 4th April with Sirius included a geologist and a drilling engineer who had hoped to discuss the foregoing points in detail but Sirius' representatives advised that they were not prepared to discuss technical matters.)

For these reasons, INEOS disagrees with the view expressed by Sirius that deep drilling cannot be shown to be capable of being carried out in a manner that would ensure that the safeguarded area of potash would be protected from sterilisation.

As Figure 1 in the technical paper demonstrates, the existing safeguarded area together with 2 km buffer zone actually encroaches into the area licensed to Third Energy under PEDL 343. There is, therefore, the real possibility that the Planning Authorities may well receive an application for planning permission to carry out hydrocarbon development within the safeguarded area (including the buffer zone) as currently shown on the Policies Map. This makes it even more important, therefore, that the Plan makes proper allowance for the possibility of competing development demands.

To address this issue the technical paper proposes the use of Oil & Gas Authority approved "interaction agreements" to deal with potential sterilisation issues- whether they emanate from proposals to drill in a mineral safeguarding area or proposals to mine for potash in an area that is already covered by a PEDL. It is proposed by INEOS that where planning permission for hydrocarbon development was sought on an area safeguarded for potash extraction, there would be a policy requirement that an interaction agreement between the operator and the Oil & Gas Authority would require to be exhibited to the Planning Authorities as part of the documentation submitted in support of the relevant application.

(iii) the need for changes to be made to the wording of the Policies and/or the wording of the Policy Justification set out in paragraphs 8.22-8.24

COMMENT: INEOS believes for the reasons set out above that the wording to the Policies needs to be revised to (i) remove the reference to the 2km buffer zone and replace it with one of a 350 metres and (ii) provide flexibility, so that if there is overlap between the potash safeguarding area and a PEDL licensed area, hydrocarbon development at surface and sub-surface will be permitted to go ahead provided certain specified criteria are met. This is entirely consistent with the national policy position which anticipates the co-existence of PEDL areas and potash/polyhalite mining, as well as other hydrocarbon exploration and mining. There is no national protection for potash to override hydrocarbon development. On the contrary, INEOS's view is that there is greater national protection for hydrocarbon development. At the very least any potash/polyhalite safeguarding policy cannot act as or have the practical effect of causing a prohibition on hydrocarbon development and must allow for the balancing of competing interests as part of development management decision making. It is not the role of plan-making to remove the conflict by sterilising hydrocarbon development (including

exploration) from being carried out either at surface or sub-surface in areas safeguarded for future potash/polyhalite mining, which is what Policy SO2 Part 3) in its current form of wording effectively does by requiring the operator to demonstrate, as an essential pre-condition to the grant of planning permission, that no significant adverse effect on the safeguarded area of potash will occur.

Draft STATEMENT OF COMMON GROUND

(i) the need or otherwise for, and the proper purpose of, a buffer zone

COMMENT: INEOS disagreed with the Planning Authorities' contention that a 2 km buffer zone is needed to safeguard the potash resource from deep drilling impacts associated with hydrocarbon development. As was explained at the safeguarding hearing session on 24th March, the evidence from the BGS technical note on which the Planning Authorities have relied to justify the buffer zones which they have applied to protect surface mineral development makes it clear that in the context of sub-surface development the imposition of a buffer zone makes no practicable difference.

INEOS understands from the meeting with Sirius that Sirius take a similar view. Beyond that no further discussion was had at the meeting on what purpose a buffer zone might serve. What follows below, therefore, are INEOS' own proposals.

As INEOS explained at the safeguarding hearing session on 24th March, it is not clear from the terms of Policy SO1 and SO2 what purpose the 2 km buffer zone is intended to serve. Although it is described as a buffer zone, there is in fact no difference drawn in the safeguarding policies between the zone and the actual safeguarding area: the operator is required to demonstrate that no significant impact on the safeguarded potash would arise whether that potash resource lies beneath the buffer zone or the safeguarded area. The buffer zone, therefore, is simply a de facto extension of the safeguarded area.

The Planning Authorities at the hearing session rejected the alternative view put forward by INEOS that the buffer zone could be interpreted as being an "enhanced assessment area" so that any sub-surface hydrocarbon proposals that were likely to encroach into the buffer zone had to demonstrate that if they were allowed to take place no sterilisation of the potash resource located at outer edge of the safeguarded area would occur.

The third alternative purpose for the buffer would be to put in place an appropriate set off distance between the outer edge of the safeguarded area of potash and the proposed hydrocarbon development. The buffer would then act as a "zone of potential influence" requiring that unless certain other criteria were met (see below) no hydrocarbon development would be permitted within the buffer zone area.

INEOS accepts that an appropriate set off distance could be put in place to ensure that if the fissures caused by hydraulic fracturing had the potential to reach the edge of the nearest boundary of the potash safeguarding area, (and the safeguarding exemption criteria proposed by INEOS (see below) were not met), the PEDL licensee would be required to present an Oil and Gas Authority approved interaction agreement to the Planning Authorities to demonstrate that the operation would have no adverse effect on the ability of the potash owners to recover their resource. A distance of 350 metres from the edge of the potash safeguarding area is proposed - representing a distance equal to the largest recorded hydraulic fracture fissure distance of 300 metres plus a 50 metre "margin of error".

3. LPAs to consider a separate policy for potash with explanatory text.

Policy SO1, Part 2) Deep Mineral Resources

Existing wording

"Potash and polyhalite resources within the Boulby Mine licensed area and the Dove Nest Farm indicated and inferred resource area identified on the Policies Map will be safeguarded from other forms of surface development to protect the resource for the future.

Reserves and resources of potash and polyhalite identified on the Policies Map, including a 2 km buffer zone, will also be protected from sterilisation by other forms of underground minerals extraction, deep drilling and the underground storage of gas or carbon, in order to protect the resource for the future."

Proposed Revised Wording

INEOS submits for the reasons set out above that the Policy SO1 Part 2) should be changed so that it reads as follows:

"Reserves and resources of potash and polyhalite identified on the Policies Map, including a 350 metres buffer zone, will also be protected from sterilisation by other forms of underground minerals extraction, deep drilling and the underground storage of gas or carbon in accordance with the provisions of Policy SO2 in order to protect the resource for the future."

COMMENT: INEOS position, for the avoidance of doubt, is that the area to be identified on the Policies Map as the "Underground Minerals Safeguarding Area" for potash should be the same area that is currently shown shaded pink on the Policies Map but surrounded by a 350 metres buffer zone rather than one extending to 2 km.

B. MM 65, page 152, Policy SO2 - Developments proposed within Minerals Safeguarding Area

Proposed Change: Revise Part 1) - Surface Mineral Resources (Requested by the Inspector)

4. **Amend criterion vi) so that it reads "constitutes "exempt" development (as defined in the Safeguarding Exemption Criteria list, as set out in paragraph 8.47)"**

(Reason - to provide a cross reference to the location of the Exemptions List)

COMMENT: *INEOS has no objection to this proposed modification.*

Proposed Change: Revise Part 2) - Deep Mineral Resources

5. **Add additional bullet point "hydraulic fracturing"**

(Reason - to provide a comprehensive list of the developments to which this part of the Policy is to apply)

COMMENT: INEOS believe that the issues which they have identified above can be addressed by amending the wording of Parts 2) and 3) of Policy SO2.

It will be noted that rather than use the term "hydraulic fracturing", INEOS has used the terms now proposed by the Planning Authorities, namely; "surface hydrocarbon development" and "sub-surface hydrocarbon development". The revised wording also makes it clear that it should be surface hydrocarbon "and/or" sub-surface hydrocarbon development that is to be regulated by the Policy. This means that applications for planning permission for vertical wells that are proposed to be drilled from well pads located on the surface of part of the finalised potash safeguarding area and horizontal boreholes that are proposed to be drilled at sub-surface through part of that safeguarded area in

circumstances where the well pad at surface is located outwith that area will both require to demonstrate compliance with the Policy.

It should be noted too that the revised wording also makes it clear given the sensitive nature of the listed developments that an applicant must be able to demonstrate that no significant risk of subsidence will occur.

The revised wording also takes account of the points made above concerning the national need for hydrocarbons and the local need for potash by making it clear that even if an interaction agreement demonstrates that an area of potash will be sterilised as a result of drilling operations, including hydraulic fracturing, planning permission can still be granted provided one of the exception criteria listed in Part 1) of Policy SO2 is met.

Proposed revised wording for Part 2) and Part 3) of Policy SO2

The proposed changes to the existing text are set out below and shown highlighted and underlined for ease of reference.

Part 2) - Deep minerals resources

In areas identified as Underground Mineral Safeguarding Areas on the Policies Map, proposals for the following types of development should be accompanied by information about the effect of the proposed development on the potential future extraction of the safeguarded underground resource, as well as on the potential for the proposed surface development to be impacted by subsidence arising from working of the underlying minerals resource:

- * Large institutional and public buildings;*
- * Major industrial buildings including those with sensitive processes and precision equipment vulnerable to ground movement;*
- * Major retail complexes;*
- * Non-residential high rise buildings (3 storeys plus);*
- * Strategic gas, oil, naphtha and petrol pipelines;*
- * Vulnerable parts of main highways and motorway networks (e.g. viaducts, large bridges, service stations and interchanges);*
- * Security sensitive structures;*
- * Strategic water pumping stations, waterworks, reservoirs, sewage works and pumping stations;*
- * Ecclesiastical property;*
- * Power stations;*
- * Wind turbines, and*
- * Surface hydrocarbon development and/or sub-surface hydrocarbon development*

Permission will be granted where the assessment demonstrates that either

(i) a significant risk of adverse impact on the safeguarded resource from the proposed development and on the proposed development from mining subsidence, will not arise

or

(ii) in the event that a significant risk of adverse impact on the proposed development from mining subsidence will not arise but a significant risk of adverse impact on the safeguarded resource is demonstrated in the assessment to be likely to occur, one of the criteria in Part 1) of the Policy (other than the final criterion) is met."

In the case of hydrocarbon development the assessment will take the form of an interaction agreement approved by the Oil & Gas Authority and exhibited to the Mineral Planning Authorities prior to the grant of planning permission.

Part 3) Protecting potash, salt and polyhalite resources from other underground development

Permission for proposals within the area safeguarded for potash, salt and polyhalite shown on the Policies Map for other forms of deep drilling (other than deep drilling associated with hydrocarbon development) or the underground storage of gas or carbon, will only be granted where it can be demonstrated that the proposed development will not adversely affect the potential future extraction of the protected mineral."

C. MM 66, page 153, Policy SO2 - Developments proposed within Minerals Safeguarding Area

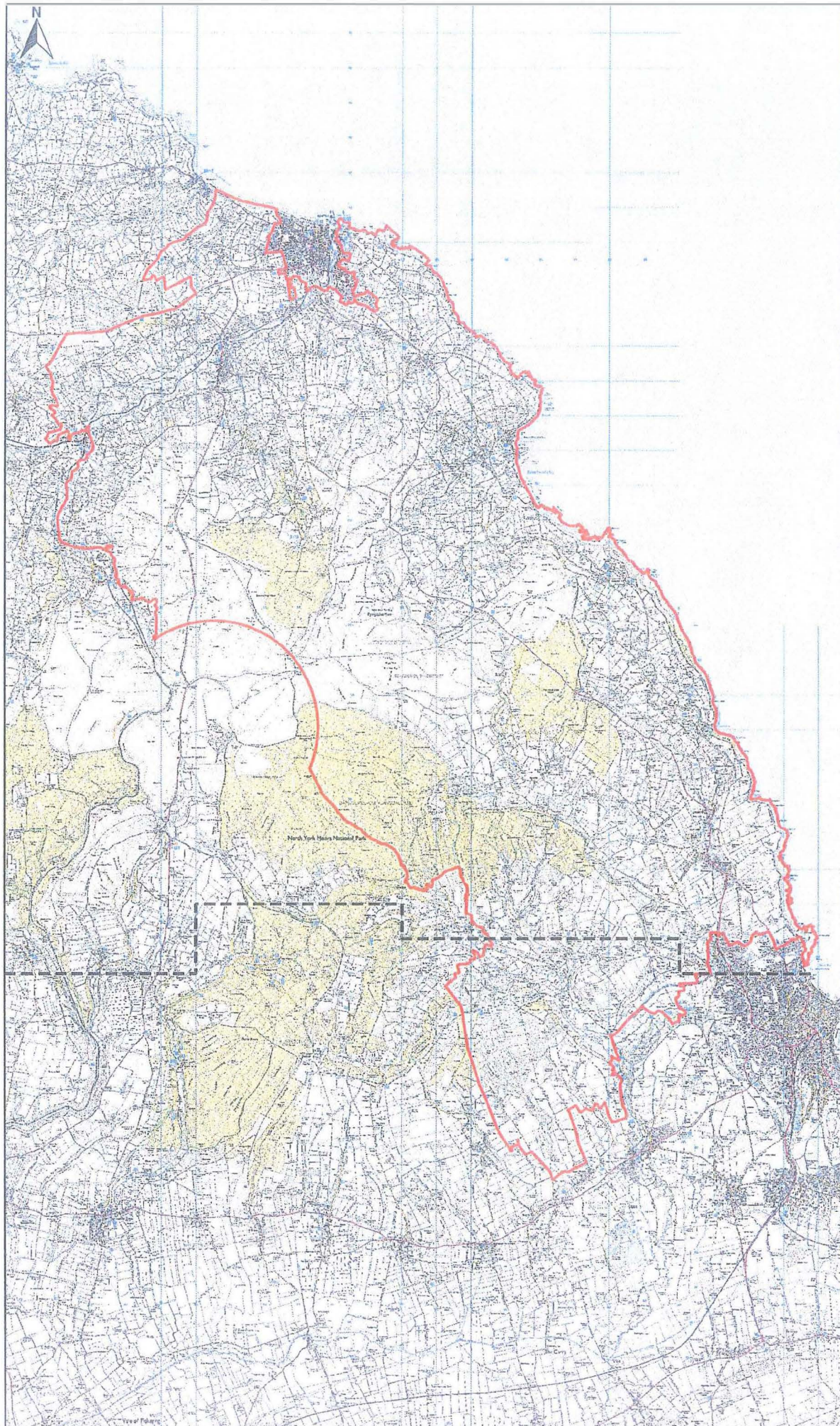
Proposed Change: Revise Part 3) - Deep Mineral Resources

6. Revise Part 3) and explanatory text at para. 8.22 by adding in a reference to the other regulatory bodies and the need to take their views into account.

COMMENT: The need to take account of the views of the other regulatory bodies is removed if the proposed revision to Part 2) concerning the involvement of the Oil & Gas Authority as set out above is accepted.

DLA Piper UK LLP

Appendix Part 1
Extended Safeguarding Area Plan



Notes:

Key:

- Onshore Mineral
- DECC Licence Boundary Line - PEDL 120, PL 77 and PEDL 347


 Durn, Isla Road, Perth, PH2 7HF
 Tel: 01738 621121 Fax: 01738 620904

Reproduced from Ordnance Survey digital map data © Crown copyright 2018. All rights reserved. Licence number: 0100031673

Client
York Potash Ltd

Job title
Minerals Extent

Onshore Mineral and Oil and Gas Licence Boundary Line

Scale at A3: 1:100,000

Plan No: YS135-0102M-Ao1 Rev 2

Appendix Part 2
Overlay Plan

Appendix Part 3
Technical Paper

City of York, North York Moors National Park and North Yorkshire County Council Minerals and Waste Joint Plan Examination

Technical Note on 'Potash' Safeguarding

1. Background

At the hearing session held on 24th March the safeguarding of potash was discussed and specifically whether safeguarding should be extended beyond its currently proposed extent (shown outlined in pink, Figure 1, Appendix 1).

The hearing inspector asked participants to consider whether the existing stand-off between UK Government Petroleum Exploration and Development Licences (PEDLs) and Potash Safeguarding Areas was too large and whether there was scope to safeguard all potash regardless of whether a PEDL existed over that area or not.

The Inspector encouraged a meeting between INEOS Upstream Ltd (one of the three oil & gas operators in the region) and Sirius Minerals PLC (one of two mining operators in the region). This meeting took place on 4th April 2018 at Sirius' planning consultants' offices in Leeds. The objective of the meeting was to establish areas of common and uncommon ground.

During the meeting it was clear that Sirius considered that the existing safeguarding area was not large enough, being only sufficient for 40-50 years of mining, and that a larger area extending considerably to the south, towards the Vale of Pickering, was being sought. No maps showing the southern boundary of the extended area were supplied but the village of Silpho was mentioned as lying on the southern edge of the extended area.

On the 6th April, INEOS received a map from Sirius' consultants showing a much-expanded area for the proposed safeguarding zone (shown outlined in blue on Figure 1, Appendix 1).

This document summarises INEOS' technical view of the proposed potash safeguarding measures, first by setting out some concerns arising from the meeting and then by statements of common and uncommon ground.

2. INEOS Concerns

2.1 Concerns About Definitions

INEOS has a number of concerns about the technical approach to defining the potash/polyhalite resource:

- The stratigraphic horizon being protected in the proposed safeguarding policy has not been defined satisfactorily; the term 'potash' is being used but both mining operators in the region (Sirius and ICL) have each stated that polyhalite is the mineral being sought for extraction (both are potassium-rich evaporite minerals but, importantly, polyhalite occurs at lower stratigraphic intervals than the potash - see Figures 2 and 3, Appendix 1). The operators of Boulby Mine stated in 2015 that potash production there (in the Boulby Potash Member of the Boulby Halite Formation) would cease, and redundancies were made as they switched to polyhalite extraction (various units in the Eglinton Formation).

- The areas of economically extractable thickness mapped by the British Geological Survey (BGS), and which may form the basis of the Local Authority's safeguarded area for potash and/or polyhalite (BGS maps lodged in the Examination data room), are conjectural because they not based on exploratory drilling required to delineate the resource away from the areas immediately being targeted for mining. It seems unreasonable to safeguard an unproven resource. In this respect, sedimentary depositional facies are as important as thickness in any assessment and this has not been adequately mapped away from the existing proposed safeguarding zones.

2.2 Concerns About Health, Safety and Regulation

The lower of the two polyhalite layers proposed to be mined at Woodsmith sits extremely close to the top of the Kirkham Abbey Formation (KAF). The KAF is the main gas reservoir for the Vale of Pickering gas fields. The gas is often sour (high levels of hydrogen sulphide) in many of the Permian gas fields. The KAF is a designated Principal Aquifer at outcrop and heavily water-bearing at depth. Other proven gas reservoirs in the area include the Brotherton Formation, which overlies the uppermost polyhalite layer.

It is INEOS' opinion that, even off-structure (i.e. away from the delineated gas fields), the water in the KAF (and possibly the Brotherton Formation) will have high concentrations of dissolved natural gas and hydrogen sulphide. The dangers posed by natural gas and hydrogen sulphide to evaporite mining in the Middlesbrough to Boulby region are well known and documented (see next section).

It is INEOS' view that any safeguarded area should consider the potential health and safety aspects of mining immediately above or through an overpressured accumulation of natural gas. The mining operation would effectively reduce formation pressure above the gas reservoir to atmospheric pressure thus creating potential for a pressure sump for gas to flow.

Known gas accumulations in the area include the large Eskdale gas field whose boundaries, as defined by UK Government mapping, seems to occur within the proposed safeguarded buffer zone for Woodsmith Mine (pink area, see Figure 1, Appendix 1). Immediately to the south of Eskdale lie the Ebberston and Ebberston South onshore gas fields and the Cloughton gas discovery. Egdon's Resolution gas discovery sits immediately offshore from the proposed area of mining.

However, the danger that INEOS would wish to highlight does not necessarily involve known gas accumulations, which can be avoided because they are delineated, but rather unknown gas accumulations which may only be revealed by 3D seismic.

In England, oil & gas licensing and exploration/development activities are highly regulated by five UK Government authorities and agencies: the appropriate Local Planning Authority (Mineral Planning Authority); The Environment Agency; The Coal Authority; The Oil & Gas Authority; and the Health and Safety Executive. Each of these organisations also has access to consultees (such as the British Geological Survey and Public Health England) for specialist advice on the proposed activities.

Oil & gas activities in the UK onshore area are governed by Acts of Parliament and European Union Directives regulated by the Oil and Gas Authority and principally, but not restricted to, the Petroleum Act (1998). From a geological environment perspective, several acts of Parliament and European Union Directives are used by the Environment Agency to tightly regulate subsurface oil & gas activities primarily with respect to groundwater protection (including, but not restricted to, The Water Framework Directive [2000], Standard Rules [2015] and Water Resources Act [1991]). Drilling engineering submissions of an appropriate well design are required to The Health and Safety Executive (HSE) based on geological prognoses in order to fulfil obligations under the Borehole Sites and Operations Regulations (1995) and The Offshore Installations and Wells (Design and Construction, etc) Regulations (1996). Interaction with seams of coal and workings in coal are regulated by The Coal

Authority under legislation set out in the Coal Act (1994). INEOS feels that it is important to emphasise that its activities in the subsurface are highly regulated to safeguard the surface environment and to protect and safely interact with groundwater resources that are present immediately below, between and above the proposed levels of potash/polyhalite extraction.

INEOS acknowledges that consultation may have taken place with OGA on the Eskdale gas field issue but it is not transparent from the Examination documentation.

For these reasons, INEOS believes that mineral mining operations, where they occur in a known hydrocarbon province, should be required to seek an interaction agreement with the UK Government's Oil & Gas Authority just as oil & gas operations must currently seek an interaction agreement with The Coal Authority where coal or workings in coal are present in the subsurface.

2.3 Environmental Concerns

Ventilation that will be required during mining to extract natural gas emitted from, for example, the underlying KAF has the potential to create fugitive methane emissions far in excess of that considered acceptable for oil & gas exploration and development activities if it were to be vented to the atmosphere. Historically, potash, anhydrite and ironstone mines in the region have experienced issues with seepage of natural gas from vertically adjacent strata and there are documented methane explosions in mines in the area to the north, between Middlesbrough and Boulby. At Boulby potash mine, encountering pockets of natural gas and hydrogen sulphide is mitigated by ventilation and a requirement to flameproof diesel engines and a ban on anything taken into the mine which could cause a spark.

INEOS is not aware of any estimates of the volume of methane vented from Boulby mine or that which might be vented from Sirius' Woodsmith development, if this is what is proposed. However, because methane is a significant greenhouse gas, its emission into the atmosphere in any quantity is tightly regulated in oil & gas activities and therefore, by analogy to oil & gas operations, of concern to INEOS.

As with interactions with defined gas fields and discoveries (Section 2.2), it may be that concerns about fugitive methane emissions have been addressed in existing consents from the mining regulators, in which case INEOS is satisfied that the issue has been dealt with.

2.4 Concerns About Timing

Given the relatively slow rate of mining, current demand for gas resource in the UK and the award of PEDL licences by UK Government in this area, it seems likely that oil & gas developments would take place before mining. If the opposite were the case, and the safeguarded area were to extend significantly southwards towards and into the Vale of Pickering, tall voids created during mining at critical depths for oil & gas operations (unlike shallower and less tall voids which may be present in former coal mining areas) would effectively sterilise both conventional and unconventional gas resource because they would form challenging engineering obstacles for gas well integrity and placement, the latter being dictated by a complex interaction of surface and subsurface constraints.

To preserve the natural gas as a national resource in its PEDL areas, its full extraction would need to:

- Precede mining by a period of no less than 3 decades after production began at any location (the estimated life of a gas well); and
- Be unencumbered in its location and method of drilling by restrictions other than those imposed by the existing five oil & gas regulators (as mentioned in Section 2.2).

Other arguments in support of oil & gas exploration and development prior to mining include:

- Exploratory drilling data acquired through oil & gas drilling could be used to de-risk:

- The potential sour gas and water hazard for polyhalite mining contained in the underlying KAF; and
- The potential for economic thicknesses of potash and/or polyhalite not to be present at all in the Vale of Pickering and areas to the south.
- 3D seismic coverage, a regulatory requirement for oil & gas operators prior to hydraulic fracturing operations, would assist mining operations in delineating the resource and in the avoidance of faults in planning mining operations.
- A multi-well gas production development in the area would create, at the stratigraphic level of polyhalite extraction, a semi-regular pattern of small-radius buffers around each well's steel casing in the potash/polyhalite that is not inconsistent with the pillar-and-room mining method that might be utilised in future mining operations. Under oil & gas regulations, the wells are sealed at all stratigraphic levels up to ground surface, to prevent leakage of fluids and gases from and between permeable strata. The drilling of oil & gas wells is carried out using the same drilling technology as that used by mining companies to evaluate the mineral resource.

2.5 Concerns About Technology Misunderstandings

At the meeting with Sirius on the 4th April, the risk of oil & gas activities creating a conduit between the gas and water contained in underlying strata and potential seams of potash/polyhalite was raised by Sirius. As previously described, oil & gas activities are strictly regulated by Government organisations (see Section 2.2) which are required to protect the subsurface environment during all phases of the hydrocarbon lifecycle (exploration, appraisal and development).

Through this regulatory mechanism, risk of creating a conduit is negligible because:

- During all phases in the lifecycle, all well bores are required to have multiple steel casing barriers to protect the overburden strata which contain designated groundwater aquifers; and
- During the appraisal and development stages, hydraulic fracturing regulations prevent operators from creating fractures in any proximity to designated groundwater bodies, two of which lie immediately beneath the potentially polyhalite-bearing strata.

3. Statements of Uncommon Ground

Sirius Assertion	INEOS Response
An economic resource exists in polyhalite in basal Zechstein evaporites south of the proposed safeguarded area (and buffer extension) into the Vale of Pickering and area to the south.	Insufficient exploratory drilling has been carried out to support this statement. The Geological Survey's assessment is based on conjectural isopachs for potash in the Boulby Potash Member.
Oil & gas drilling activities, if carried out before mining, will sterilise the evaporite resource with steel casing which will require exclusion buffers that cannot be mined.	The mining method proposed requires pillars to support excavation of rooms during mining. Small radius buffers around gas wells in the subsurface would effectively create such pillars.
Oil & gas drilling and hydraulic fracturing activities will create conduits for gas and water which will sterilise potential mining of the evaporite resource.	Oil & gas operators are required to work under UK legislation and EU directives which are strictly enforced by UK Government regulatory bodies. Designated groundwater resources which exist immediately beneath, within and above the potential potash/polyhalite resource must be protected by oil & gas operators during drilling and fracturing operations. The risk of creating conduits is negligible in comparison with the risk posed by extraction of polyhalite immediately above the Kirkham Abbey Formation - a natural gas reservoir and Principal Aquifer bearing groundwater which is likely charged with dissolved natural gas and hydrogen sulphide. This negligible risk is no higher than that posed by exploratory drilling required by the mining company to prove the existence of the resource in the first place.

4. Statements of Common Ground

INEOS has no specific issue with the existing proposals for the 'potash' safeguarded area (shown outlined in dark pink in Figure 1, Appendix 1) being extended to include the area currently described as the "2 km buffer zone" (shown outlined in light pink in Figure 1, Appendix 1) with a new 350 metres buffer zone around it, subject to the following provisos:

- Whilst INEOS cannot speak for the industry as a whole, or other oil & gas operators in the area, it notes that if the safeguarded area is extended to include the 2km buffer area it will encroach into a PEDL (PEDL343) awarded to Third Energy and their partners in the UK 14th Round of Onshore Licensing.
- INEOS does have environmental, health and safety concerns about the proximity (both vertical and horizontal) to the large Eskdale Gas Field (currently sitting in oil & gas unlicensed acreage) to the buffer zone defined for the Woodsmith Mine. Similar concerns would apply to the Ebberston and Ebberston South gas fields and the Cloughton gas discovery should the proposed safeguarding area be extended southwards from its currently indicated extent.

David Goold BSc (Hons), MSc, MSc (Dist)
 Consultant Geologist
 INEOS Upstream Ltd
 10th April 2018

Appendix 1

Figure 1. Map showing existing proposals for ‘Potash Safeguarding Areas’ (pink outlines) and Sirius’ extended area proposals (blue outline) relative to petroleum explorations and development licences (PEDLs) and gas fields/discoveries. Note, other non-INEOS operated PEDLs exist in the immediate offshore area (not shown).

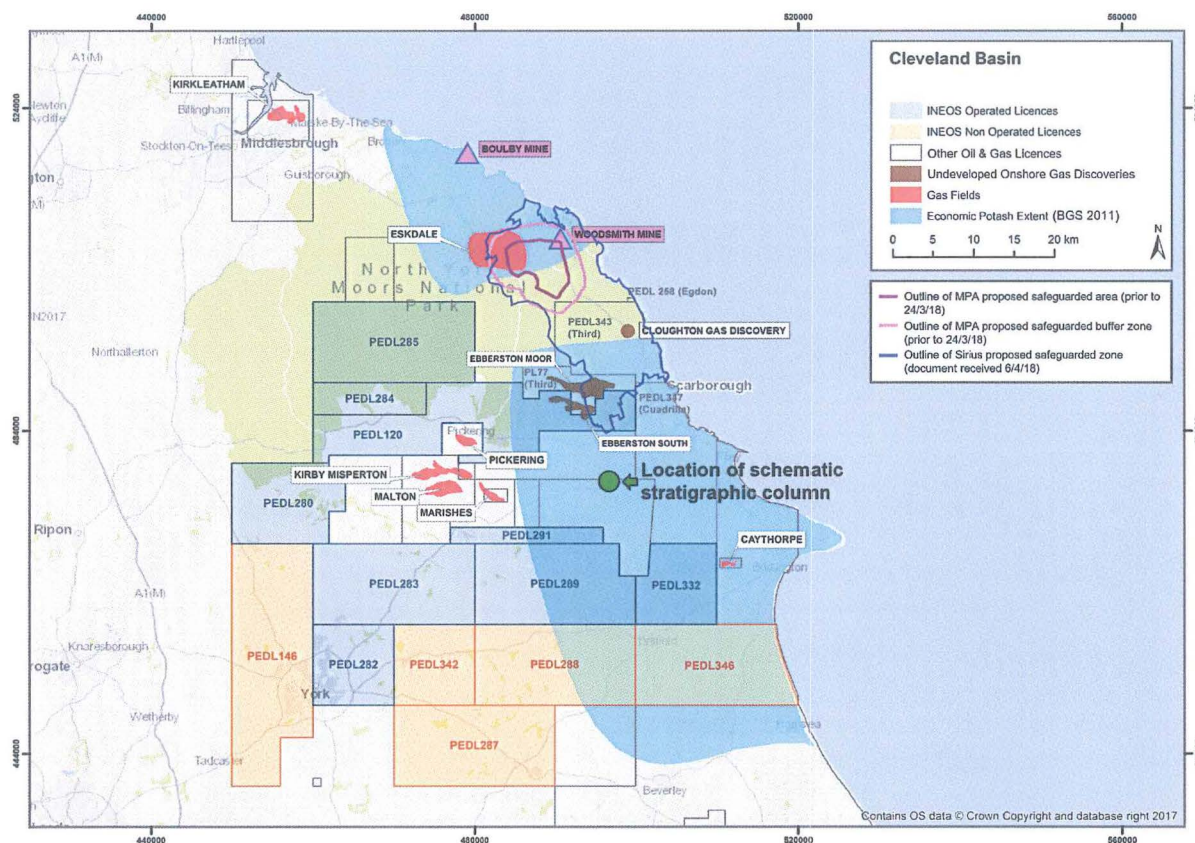


Figure 2. Schematic stratigraphic column to illustrate the vertical relationship between the Permian potash and polyhalite layers and oil & gas accumulations in the Vale of Pickering. See Figure 1 for location. See Figure 3 for expanded view of Permian sequence.

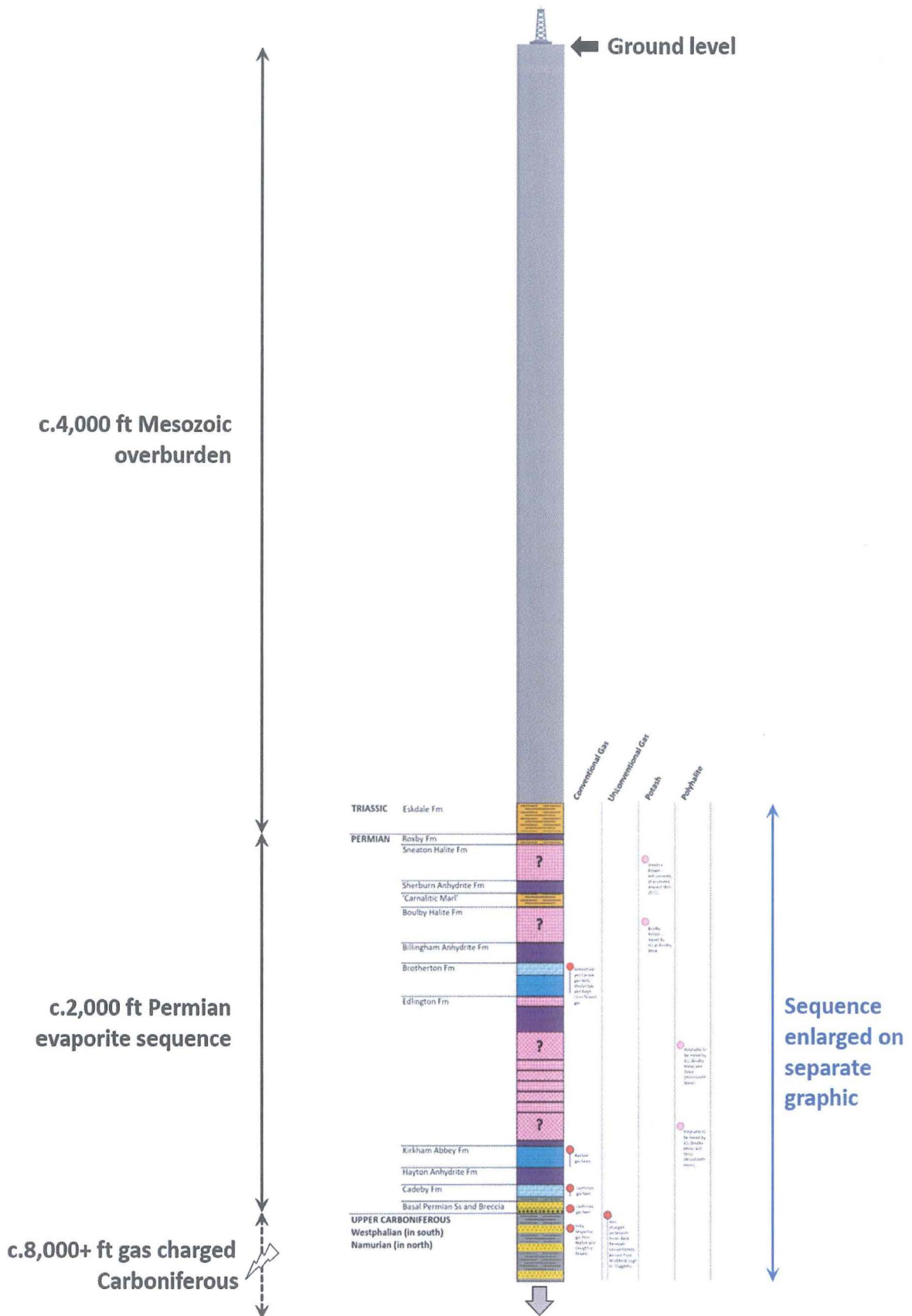


Figure 3. Enlarged lower part of schematic stratigraphic column shown in Figure 2. Note that vertical scale is indicative only. See Figure 1 for location.

