Cleveland Potash Ltd

Boulby Mine

Travel Plan

Wood Environment & Infrastructure Solutions UK Limited – February 2020

Report for

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No.	Details	Date
1	Draft v1	Mar 2020
2	Final	May 2020

Contents

1. Introduction

1.1 Purpose

Wood Environment and Infrastructure Solutions UK Limited (Wood) has been appointed by ICL Boulby to produce a Travel Plan in support of the planning application for the extension of the working life of Cleveland Potash Mine, hereafter, referred to as the Mine Site. The proposed working life extension of the Mine Site seeks to extend the extraction license period by 25 years, with the current license due to expire in 2023.

The planning application would see changes to the site in terms of the operations being undertaken on site and the number of staff employed. However, the number of staff employed at the site in 2019 was around 560, reduced from the number of staff considered when the surveys were commissioned for this Travel Plan (750 in 2017). Under the existing planning permission, staff numbers have been higher than this figure, with over 1000 employed at times during the life of the existing permission. An expected maximum of 820 staff under the new planning permission is predicted, and the data on which this Travel Plan is based is therefore considered to be representative of the predicted staff numbers.

The purpose of the Travel Plan is to set out the applicant's commitment to delivering a sustainable and accessible employment site, which encourages members of staff and visitors to travel to the Mine Site sustainably.

As the site is currently operational, a travel to work survey has been conducted to establish current staff travel patterns and identify any opportunities to encourage modal shift. The content of the Travel Plan has been based on the travel to work survey results as well as guidance supplied by North Yorkshire County Council (NYCC).

1.2 Policy and Guidance

A Travel Plan is a long-term management strategy for an occupier or site, which seeks to deliver sustainable transport objectives through the development of measures to encourage sustainable travel and reduce single occupancy vehicle usage. The following policy documents have been reviewed to ensure that this Travel Plan accords with national and local policy.

National Planning Policy Framework (February 2019)

The National Planning Policy Framework (NPPF, 2019) sets out the Government's planning policies for England and how these should be applied. The NPPF must be taken into account in the preparation of local and neighbourhood plans and is a material consideration in planning decisions. At the heart of the NPPF is a presumption in favour of sustainable development, an approach which should be followed by local planning authorities in their plan making and decision taking. Decision takers at every level are encouraged, where appropriate, to consider favourably applications for sustainable development and an emphasis is also made within the NPPF on local planning authorities working proactively with applicants at pre-application stage to secure this.

The NPPF identifies the need to favour sustainable transport modes to enhance travel choice, and to locate developments that generate significant movement where the need to travel will be minimised and the use of sustainable transport modes can be maximised.

The NPPF sets out that all developments that generate significant amounts of movement should be supported by a Transport Statement or a TA and a Travel Plan (paragraph 111), the latter being identified as a key tool to deliver sustainable transport objectives.

With specific regards to highway considerations in decision making, the NPPF (Paragraph 109) states:

"Development should only be prevented or refused on highway grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe".

North Yorkshire Local Transport Plan (2016 to 2045) (NYLTP)

The NYLTP sets out the county council's transport strategy and agenda up to 2045. The LTP recognises the requirement to help deliver sustainable development and with regards to travel planning, the following information has been included:

Travel Plans identify the developer's proposals to reduce the amount of traffic associated with the development by encouraging the use of alternative modes of transport to the car. The absence of detailed National Guidance on the content of these documents will result in the LHA preparing local policies and protocols to ensure the submitted TAs and TPs adequately address all the issues of concern to the LHA on North Yorkshire's highway network. [Para 10 Extract]

Travel Plans will continue to be assessed in accordance with NPPF. They will need to reflect the emerging links between travel planning and the health agenda. [Para 14]

In lieu of any specific Travel Plan guidance, NYCC have provided notes advising on the content and scope of the Travel Plan document, which have been followed and incorporated accordingly.

1.3 Structure of the Travel Plan

This Travel Plan (TP) is structured as follows:

- Chapter 2 identifies the existing situation of the site;
- Chapter 3 analyses the existing travel behaviour of employees;
- Chapter 4 sets out the role of the appointed travel plan co-ordinator:
- Chapter 5 looks at monitoring the proposed objectives for the site; and
- Chapter 6 provides a summary.

2. Site Context

2.1 Introduction

This chapter presents the existing situation and location of the site and the surrounding opportunities for travel by mode.

2.2 Mine Site Operation

The Mine Site is located approximately 2km east of the village of Easington in the North York Moors National Park. The Mine has historically extracted sylvinite, polyhalite and rock salt running a 24-hour operation, 363 days of the year. The Mine Site employs 560 people with around 60% being employed in the mining of minerals on a 12-hour rolling shift arrangement (i.e. mixed start and finishing times), working 4 days-on and then 4 days-off. The remaining 30% of the workforce are in office base roles, above ground working on a Monday to Friday basis, but with mixed start and finishing times.

The mined products are removed by a mixture of rail and road freight. The majority are transferred via a private rail head connected to the site and the rest transferred on the local highway network by Heavy Goods Vehicles (HGVs). In relation to highway movements, the Mine Site is currently restricted to exporting 150,000 tonnes per annum of product, generating a maximum of 66 HGV loads per day.

The site provides the following facilities:

Table 2.1 Onsite Parking and Employee Facilities

Location	Car Parking	Cycle/Motorcycle Parking	Other Facilities
Admin	31 car parking spaces 5 allocated visitor parking bays just outside the building	None	Separate male/ female toilets
Gatehouse	13 car parking spaces 8 visitor and pool car spaces 2 laybys on the access road onto site with the potential for 8 cars to park 2 disabled spaces	None	Separate male / female toilets
Dome Sports Centre (staff only)	184 parking spaces	None	male/ female changing rooms (includes toilets, showers and lockers)
Main Site Area	15 spaces at the ESB building 6/8 spaces opposite RLO/weighbridge for the operators	Cycle/motorbike shed, approximately 30 bicycles or 20 motorbikes	9 showers in the ESB building Locker room with approx. 400 lockers (divided into two sections one for clean clothes & one section for dirty clothes)

Location	Car Parking	Cycle/Motorcycle Parking	Other Facilities
	12 potential spaces directly outside the Training Department building No dedicated visitors parking bays on the main surface car park. No dedicated disabled parking		
Adjacent to the Main Mine Area	180 spaces at the Main Mine End Upper Car Park 51 spaces at the Management & Tech Services Building Dark Matter area has 6 spaces plus 20 informal parking spaces	Cycle/ motorbike shelter, approximately 16 bicycles or 10 motorbikes	**Laundry** Portakabin (2x Washers, 2x Dryers), Bath House Cabin (1x Washer, 1x Dryer), Rescue Room (1x Washer, 1x Dryer) **Lockers** in the Mine Services Building (Male + Male Management), Tech Services Building (Female) and separate lockers for Dark Matter in their building (Male / Female) **Showers** in the Mine Services Building (Male + Male Management), Tech Services Building (Female), Winder House (Male Single Shower) and separate showers for Dark Matter in their building (Male / Female

2.3 Local Road Network

The Mine Site is bordered by the A174 to the north, agricultural and forestry land to the east, forest to the south and agricultural land to the west. The site is only accessible via the A174.

The A174 is a strategic local highway, which runs east to west between Whitby and Middlesbrough. At the Mine Site entrance, the A174 is approximately 15m wide facilitating single-lane traffic in both directions, a right-turn lane providing access to the site for those arriving from the northwest and a left-turn entry filter lane for those approaching from the southeast. On approach to the Mine Site access, the A174 is street-lit in both directions and has a footway running on both the north and south of the carriageway for approximately 150m to the east and west of the site entrance.

2.4 Pedestrian and Cycle Network

Within the vicinity of the Mine Site, a footway is present along the north and south of the carriageway for approximately 150m to the east and west of the site entrance, affording access to two bus stops. A crossing point with dropped kerbs and tactile paving is present approximately 120m southeast of the site entrance. Away from the Mine Site the closest footway network is provided with the villages of Easington and Staithes to the west and east of the Mine Site respectively.

Within the vicinity of the Mine Site entrance, National Cycle Route 1 (NCR) routes along the A174 and provides a connection between the Mine Site and Staithes to the east via the A174 and Cowbar Lane and Loftus to the west via the A174 and Boulby Bank.

2.5 Public Transport Network

Bus Provision

Bus stops are situated within the vicinity of the Mine Site access. The northwest bound bus stop is approximately 30m north of the site entrance whilst the southeast bound bus stop is 160m south. Both stops provide covered seating and timetables.

The X4 is the only bus route calling at the site, routing between Whitby in the south and Loftus in the north with a secondary route by the same number (X4) extending the service to Middleborough in the north. A summary of the timetable is shown in Table 2.2 below.

Table 2.2 Local bus services providing a connection to the site

Service	Provider	Route	EB Frequency	WB Frequency
Sapphire X4	Arriva bus	Whitby* – Sandsend – Runswick Bay – **Staithes** – Loftus – Carlin How – Brotton – Saltburn* – Marske – Redcar* – Coatham – Middlesbrough.	**Monday-Friday:** Approximately two every hour between 06:26 and 20:01. **Saturday:** Approximately two every hour between 06:26 and 20:01. **Sunday:** Approximately two every hour between 09:04 and 20:04.	**Monday-Friday:** Approximately two every hour between 07:30 and 20:35. An early service calls at the stop at 06:30. **Saturday:** Approximately two every hour between 07:35 and 20:35 An early service calls at the stop at 06:35. **Sunday:** Approximately two every hour between 11:12 and 19:12.

*Stops at rail stations.

Source: https://www.arrivabus.co.uk/globalassets/documents/north-east-services-documents/no-covers-x4-from-26-may-2019.pdf

Rail Provision

The closest station is located in Saltburn approximately 10km west of the Mine Site. Other stations include Markse and Whitby, all accessible via the Sapphire X4 bus provision. There is a half-hourly service (Mondays to Saturdays) from the station to Middlesbrough and Darlington, with certain trains continuing to Bishop Auckland (every two hours, increasing to hourly at peak times) and two early morning through services to Newcastle via Durham. There is an hourly service on Sundays (two hourly to Bishop Auckland).

2.6 Summary

Whilst the Mine Site benefits from existing sustainable travel links, it is noted that these are relatively limited given the remote nature of the Mine Site. As a result careful consideration has been given to the types of measures that could be implemented to encourage modal shift, bearing in mind the existing constraints on sustainable travel provision.

3. Existing Travel Patterns

3.1 Introduction

A travel to work survey was conducted at the Mine Site in 2017 to qualify and quantify existing travel to work behaviour. A copy of the questionnaire has been included in Appendix A.

Out of the 750 staff members employed at the site at the time, 298 completed the questionnaire, which represents a 40% return rate.

The questionnaire was divided into 5 distinct sections:

- Personal information; which recorded the role of the employee and their postcode;
- Shift Patterns: an average weekly timesheet:
- Employment status;
- Six questions regarding travel behaviour; and
- A final question for desk based personal on working habits and methods.

The results of the survey have been presented within the following section.

3.2 Personal information & Shift Patterns

The reasoning behind question 1 and 2 of the questionnaire was to understand where staff were located in relation to the Mine and to identify any patterns in the times staff travel. By comparing personal abode locations with shift patterns a number of potential solutions to changing an individual's mode of transport could be identified. Identifying areas with a high-density of site employees who leave within the same hour/s could warrant further investigation. Examples include:

- providing staff busses or coaches;
- Identifying routes for towns/villages/individuals who express an interest in cycling/running/walking;

1. Personal information

Surname.....

Role.....

Home postcode.....

2. In an average week, what time do you usually arrive and leave work?

Please record your Time In, Time Out and if Not Applicable.

Monday.....
Tuesday.....
Wednesday.....
Thursday.....
Friday.....
Saturday.....
Sunday.....

3.3 Existing Patterns in Travel Behaviour

Primary and secondary modes of transport

Questions 4 to 9 were multiple option style questions concerning modes of transport and attitudes to alternative methods of transport.

4. What is your principal mode of transport?

O Drive car alone
O Car share as driver
O Car share as passenger
O Dropped off
O Motorcycle
O Taxi
O Bus
O Cycle
O Train

5. In addition to your principal mode of transport (question 4) what other method/s do you use?

O Drive car alone
O Car share as driver
O Car share as passenger
O Dropped off
O Motorcycle
O Taxi
O Bus
O Cycle
O Train

Figure 3.1 provides a pie chart showing the modal share of primary transport methods used by staff.

Figure 3.1 Primary mode of transport

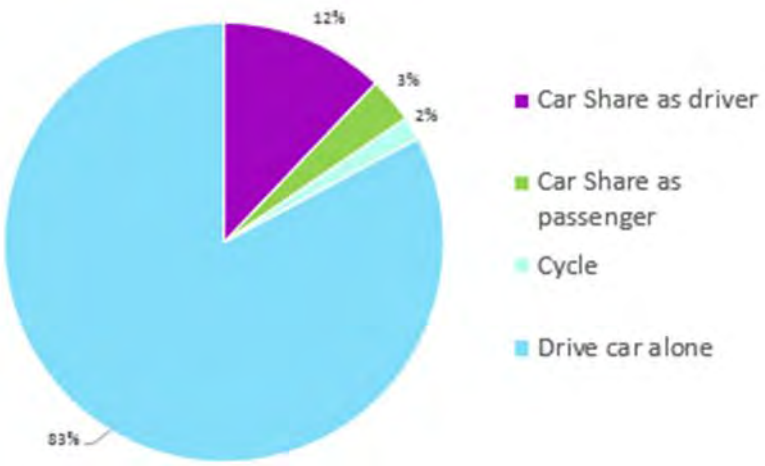


Figure 3.2 Considering your answer to Q4 (principle mode of transport) why do you use this?

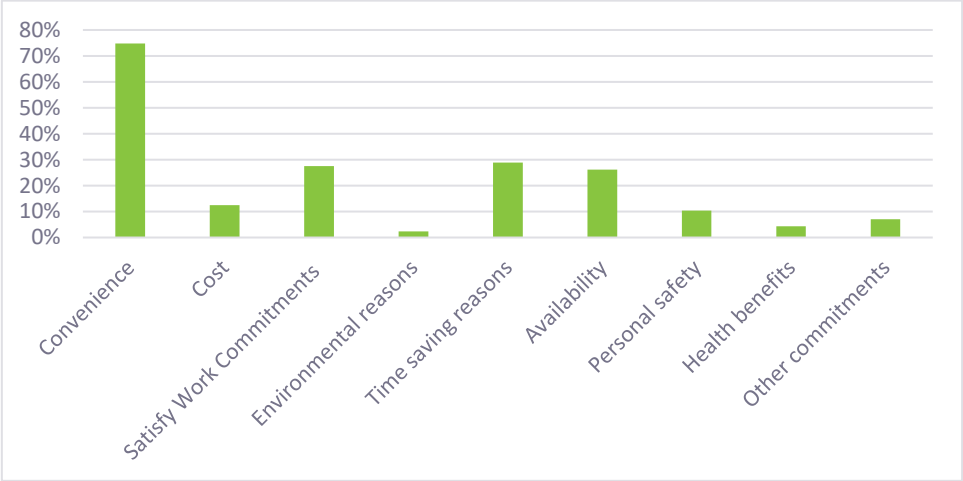
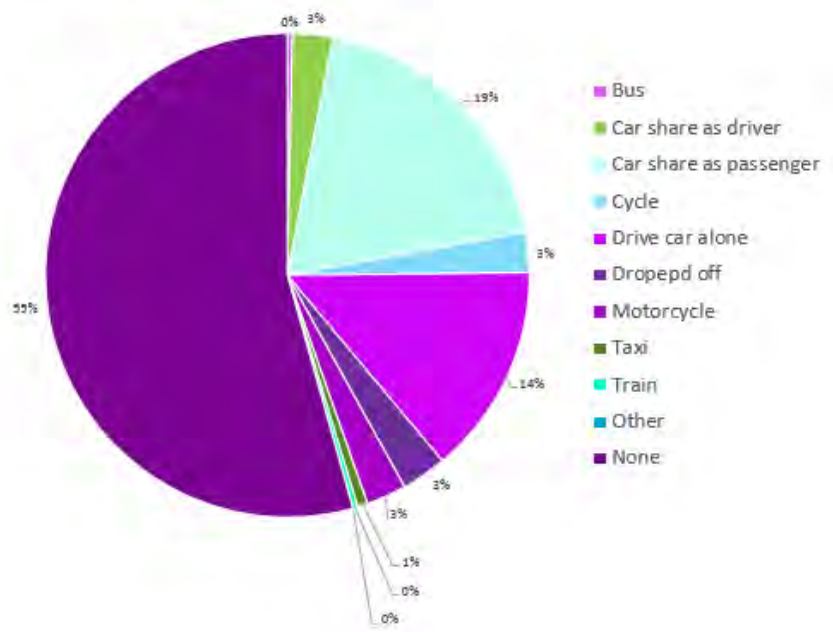


Figure 3.3 Secondary mode of transport



Of the 298 who completed the questionnaire, 55% recorded that they would make no change when it came to their secondary mode of transport (question 4) whilst 14% explicitly opted for remaining in/using a SOV to get to work in addition to 22% opting for a car-sharing arrangement and 3% being dropped off.

This leaves 6% of those surveyed opting for an alternative method of transport (bicycle, motorcycle, taxi, train, other) if they were to lose access to their private vehicle with only 0.6% opting for public transport. Of this 6%, half opted to choose cycling, an increase of 1% of those primarily use cycling as a method of transport.

Alternative modes of transport

As presented in figure 3.4-3.5, 66% said nothing could be done to convince them to use public transport and 70% said nothing could be done to convince them to use cycling as a means to get to work.

Figure 3.4 What could be done to encourage you to travel by public transport?

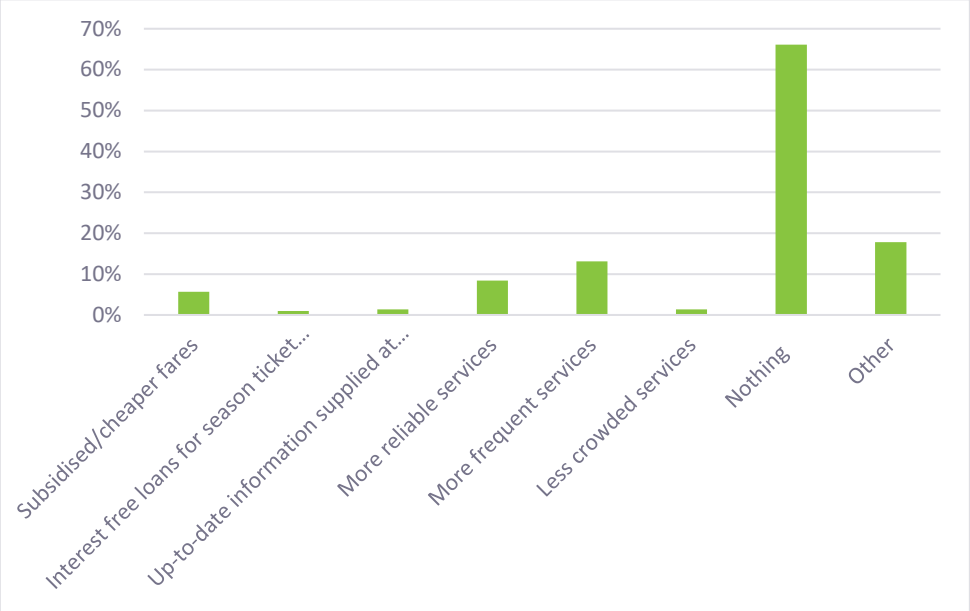


Figure 3.5 What could be done to encourage you to travel to work by bicycle?

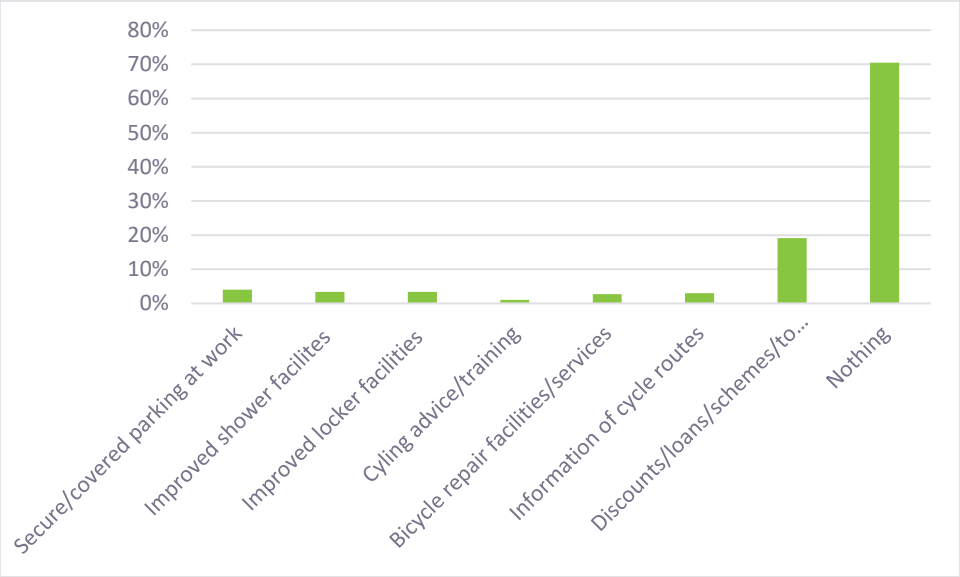


Table 3.1 Suggested acceptable Walking & Cycling Distances

		Town Centres	Commuting/School	Other Trip Attractors
Walking*	**Desirable**	200m	500m	400m
	Acceptable	400m	1,000m (1km)	800m
	Preferred maximum	800m	2,000m (2km)	1,200m (1.2km)
Cycling**	**Acceptable**	4.8km	4.8km	4.8km

	Maximum	8.0km	8.0km	8.0km

*Source: IHT (2000). Guidelines for Providing for Journeys on Foot. IHT: London
**Adapted from guidance contained within LTN 2/08 Cycle Infrastructure Design (Para 1.5.1)

Of the 298 employees who completed a questionnaire, 7 live within the preferred maximum 2km walking distance and 34 live within the preferred maximum 4.8km cycling distance. The site has limited connections with pedestrian footways only providing links to a northbound and southbound bus stop and a national trail/ bridleway approximately 280m north-east of the site entrance which is not a suitable route for commuting.

Quantitative data from the completed questionnaires highlights staff issues regarding the use of sustainable methods of travel reflecting the information in **Table 3.1.** Other recurring themes staff supplied in the "other" reasons box of question 7 and 8 are listed below:

- The physical nature of the job;
- The length and conditions of shifts (12-hour shift in 40 degree temperatures);
- The local topography being physically demanding for cycling and/or walking;
- The unlit, unsegregated highway providing access to the site from towns surrounding the site;
- Changing work patterns amongst staff members (2 days, 2 nights at 4 on 4 off);
- Efficiency of travelling to site amongst work patterns and timings; and
- Living too far from the site for it to be a feasible option.

As presented in **Figure 3.5-7** and the recurring themes from the questionnaires, the majority of staff perceive no benefit of using sustainable modes of transport or encouragement to do so.

Those who did register an interest in public transport (32%) and cycling to work (27%) have had their opinions recorded in **Table 3.2** and **Table 3.3**.

Table 3.2 "What could be done to encourage you to travel by public transport?" results

Reason	Actual number of respondents who registered an interest (from 289)	Percentage of those who registered an interest (%)
Subsidised/cheaper fares	17	6
Interest free loans for season ticket purchases	3	1
Up-to-date information supplied at work (routes/times/fares)	4	1
More reliable services	25	9
More frequent services	39	13
Less crowded services	4	1
Nothing	197	68
Other (not suitable/available/possible)	67	23

Bus routes pass the site between 06:33 and 20:38 northbound and between 06:23 and 19:58 southbound Monday-Friday with reduced service on weekend days and bank holidays. Given that buses pass the site

between 6am and 8pm and the site operates 12-hour shifts, there are only two hours a day when staff could arrive and depart by bus.

Table 3.3 "What could be done to encourage you to travel to work by bicycle?" results

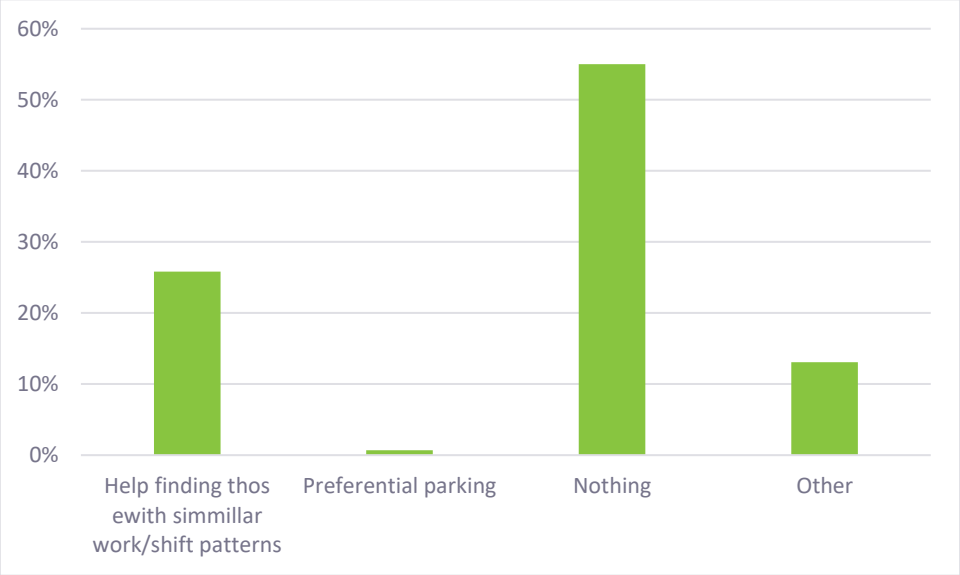
Reason	Actual number of respondents who registered an interest (289)	Percentage of those who registered an interest (%)
Secure/covered parking at work	12	4
Improved shower facilities	10	3
Improved locker facilities	10	3
Cycling advice/training	3	1
Bicycle repair facilities/services	8	3
Information of cycle routes	9	3
Discounts/loans/schemes/to buy bicycles/equipment	57	20
Nothing	210	73
Other (not suitable/available/possible)	54	19

Car-sharing

One option of reducing the traffic associated with the site was the proposal of car sharing. 15% of responders already car share (driver & passenger) as a primary method of getting to the site and 22% of responders do so as a secondary method (questions 1 & 2).

Question 9 of the survey asked what could be done to encourage car-sharing as an option for accessing the site. The results displayed in Figure 3.7 show the majority who do not already car share (55%) do not want to alter their travel behaviours however, 26% of the responders ticked the option of "Help finding those with similar work/travel patterns". The majority of the 13% who cite 'other' as a reason are those who already do or have other commitments whilst preferential parking only scored 1% of the vote.

Figure 3.6 What could be done to encourage you to travel by car sharing?



For car-sharing to be a valid option, shift-times have to be collated and cross-examined with staff abodes to provide a network amongst those who live within the vicinity of one another. By collating this data the Mine will be able to produce an online data source for employees to check if there are others who are interest in car-sharing within their area and on a similar work-shift.

Other options for site-management are altering shift times in favour of those who are willing to and capable of car-sharing however, those willing to car-share but not realistically capable of doing so risk being penalised for matters out of their control.

Time Sheet Analysis

The intention of recording time sheets of staff was to cross examine patterns with those who were open to car-sharing or provision of a bus to collect staff, reducing dependency on SOV's. Of the 298 completed questionnaires, 116 shift patterns were recorded. 26% of these were individuals, 20% of these were shared amongst 2-5 employees, 16% were shared amongst 6-10 employee's and 27% were shared between 11-21 employees. 22 individuals did not record a coherent timesheet for analysis.

Too clarify shift patterns, a site operative was contacted to provide information on the work patterns amongst staff at the site.

Employees at the Mine can be divided between underground and surface staff. Both sets of staff work on a rotating shift basis (25 shifts for underground staff and 24 shifts for surface staff). A summary of shift patterns and staff who work on these has been included in Table 3.3–3.4 to assist with understanding.

Table 3.4 Underground staff

Shift	Total staff	Total % staff on shift
Backs 14:00 to 22:00	6	1%
Day 5:30 to 13:30	1	0%
Day 6:00 to 14:00	30	7%

Day 6:30 to 14:30	2	0%
Day 7:00 to 15:00	4	1%
Day 7:30 to 15:30	1	0%
Day 8:00 to 16:00	3	1%
Days 4:00 to 12:00	1	0%
Days 4:30 to 12:30	1	0%
Fronts 06:45 to 18:45	1	0%
Fronts 5:00 to 16:30	1	0%
Fronts 6:00 to 14:00	7	2%
Fronts 6:00 to 17:30	34	7%
Fronts 7:00 to 18:30	5	1%
Fronts 8:00 to 19:30	1	0%
Fronts 8:30 to 20:00	60	13%
Nights 17:00 to 4:30	1	0%
Nights 18:00 to 05:30	18	4%
Nights 18:45 to 06:45	1	0%
Nights 19:00 to 06:30	3	1%
Nights 19:00 to 6:30	1	0%
Nights 19:30 to 07:00	60	13%
Nights 20:00 to 07:30	1	0%
Open 8 hours (ONLY FOR MANAGERS)	**22**	**5%**
Rest DAY	189	42%
Total	454	100%

The majority of the underground shifts are staffed by individuals or small teams. Only the shifts recorded below have staff in double figures.

- Day 06:00 to 14:00
- Fronts 06:00 to 17:30
- Fronts 08:30 to 20:00
- Nights 18:00 to 05:30 and
- Nights 19:30 to 07:00

Table 3.5 Surface staff

Shift	Total	Total % staff on shift
Backs 12:30 to 20:30	3	1%
Backs 13:00 to 21:00	2	1%
Day 05:30 to 13:30	1	0%
Day 06:00 to 14:00	6	3%
Day 07:00 to 15:00	7	3%
Day 07:30 to 15:30	5	2%
Day 08:00 to 16:00	40	19%
Day 08:30 to 16:30	8	4%
Day 09:00 to 15:00	1	0%
EXCO	10	5%
Fronts 05:30 to 17:30	2	1%
Fronts 05:30 to 12:30	3	1%
Fronts 05:30 to 13:30	2	1%
Fronts 06:00 to 17:30	1	0%
Fronts 06:00 to 18:00	14	7%
Fronts 07:00 to 16:00	1	0%
Fronts 07:00 to 19:00	1	0%
Nights 17:30 to 05:30	2	1%
Nights 18:00 to 05:30	1	0%
Nights 18:00 to 06:00	18	8%
Nights 19:00 to 07:00	1	0%
Nights 20:30 to 05:30	2	1%
Open 8 hours (ONLY FOR MANAGERS)	34	16%
Rest DAY	48	23%
Total	213	100%

The majority of the shifts are staffed by individuals or small teams. Only the shifts recorded below have staff in double figures.

- Day 8:00 to 16:00
- EXCO

- Fronts 06:00 to 18:00
- Nights 18:00 to 6:00

The variation of shift patterns amongst staff, the incohesive shift-swap times of underground and surface staff and the location of their private residence provides difficulty in creating a set-structure plan to facilitate car-sharing at this level.

3.4 Summary

The existing modes of transport used to travel to the Mine is principally SOV's. Car-sharing has been identified as a popular choice regarding secondary mode.

As noted above 66% of those asked said nothing could convince them to use public transport and 70% said nothing could convince them to use cycling as an alternative means of getting to work.

The site is a 24-hour operation running 363 days of the year. Shift patterns amongst staff vary depending on specific job areas (office and subterranean) and individual roles (mining, electrical, engineering etc.).

Due to the nature of the work at the Mine, location of the site and residency of staff it is unlikely the 22% of those who registered an interest in car-sharing as a method of commuting would be able to do so.

A total of 26% of those who were asked what could be done to encourage car-sharing ticked the option of "Help finding those with similar work/travel patterns", although the majority (55%) declared nothing would encourage them to do this.

4. Travel Plan Co-ordinator

4.1 Introduction

A travel plan co-ordinator (TPC) will be appointed at the Mine to implement and track the recommendations based on the feedback of staff outlined in chapter 3 of this report. This chapter assesses the existing situation and proposes changes to reduce dependency on SOV's.

4.2 Existing situation

The principal mode of transport employed by staff to access the site is SOV's that make up 83% of the primary modal share whilst 15% car-share. Currently, only 2% use alternative methods, all of it being cycling.

When replying to changes in travel behaviour 55% recorded that they would make no change when it came to their secondary mode of transport whilst 14% explicitly opted for remaining in/using SOV's. However, 22% opted for car-sharing if assistance with finding like-minded staff on similar shifts in their residential area was provided. It should be considered that peoples intentions are not possible when considering the working nature of the site.

This leaves 6% of those surveyed opting for an alternative method of transport (bicycle, motorcycle, taxi, train, other) if they were to lose access to their private vehicle with only 0.6% opting for public transport. Of this 6%, half opted to choose cycling, an increase of 1% of those primarily use cycling as a method of transport. Public transport was an unpopular option amongst surveyed staff with distance, time, cost and availability (in conjunction with shift patterns) being listed as reasons for it not being a valid choice.

4.3 Proposed changes to encourage modal shift

No change in the modal shift is sought by this travel plan, the objective is to sustain existing levels and inform staff of any alternative modes. To meet these objectives the travel plan co-ordinator will implement the measures below.

Car-sharing

To facilitate car-sharing for those who registered an interest in doing so, the TPC and the Mine will identify the locations of staff who live within the vicinity of each other and whose shifts can be aligned to facilitate car-sharing. This does not mean all of those who registered an interest in the scheme will be able to take part because of the operating nature of the Mine but it will provide an alternative option for some staff.

Cycle to work scheme

To facilitate the staff who registered interest in cycling, a discount scheme will be launched in-conjunction with https://www.cyclescheme.co.uk/ offering staff the opportunity to spread the cost of purchasing a bicycle which can be used to commute to and from the site. Literature on cycle routes, local cycle shops and the benefits of the cycling will be provided to staff who sign up and the provision of a Dr.Bike service, providing once per annum annual onsite maintenance session will be introduced.

Again, due to the operation mannerisms of the Mine and nature of the work, a significant reduction as SOV's are swapped for bicycles is unlikely but it will provide an alternative option for some staff.

Public Transport

Although unpopular amongst staff, public transport will be advertised as an option with information packs and displays in staff areas set up to inform staff of bus service times and fares.

Electric vehicles

Investigate the option for the Mine to assist employees with the purchase of a fully electric cars. Plus provide electric vehicle charging points for 10% of the existing parking provision, with the type of charging equipment provided to be agreed with the Local Planning Authority.

4.4 Conclusion

The nature of work, location of the Mine and residency of staff are factors that influence travel behaviour and are out of the TPC's control. However, where staff have registered interest, acknowledgment has been provided and means to encourage alternative modes have been facilitated.

5. Travel Plan Objectives and Targets

5.1 Introduction

This chapter will outline the objectives of this Travel Plan, introduce targets to meet these objectives.

5.2 Objectives

The outcome of this Travel Plan is to meet develop an awareness of and provision for sustainable travel options to and from the site amongst staff.

5.3 Targets

When setting targets, they need to be in accordance with the **SMART** (**S**pecific, **M**easurable, **A**chievable, **R**ealistic and **T**ime bound) framework, however, given the Mine's location and operating procedures, alterations to the existing practices are limited. The targets have been presented in **table 4.1.**

Table 5.1 Travel Plan targets

Target	Timescale
Maintain modal split with a view to encourage staff to use alternative modes of transport when/where possible.	Annual review
Provide local public transport information packs and government backed subsidy packages such as cycle to work to encourage alternative modes amongst staff	Annual review
The staff at the site will undergo periodic review to ensure travel patterns do not change and address areas of improvement.	Annual review

5.4 Summary

The targets in this Travel Plan will be monitored and measured at annual intervals for the duration of the planning permission. The monitoring of these targets will inform the review and, if applicable, the modification of the Travel Plan. The monitoring strategy is included in chapter 6.

6. Monitoring

6.1 Introduction

This chapter provides details of how the Travel Plan measures will be monitored over the course of the Travel Plan's lifespan which would coincide with the planning permission for the extended time period of the Mine. This specific Travel Plan should last for five years with the appropriate revision taking place thereafter. The TPC's role has been presented in chapter 4 whilst a specific objective and targets have been presented in chapter 5. This chapter looks at how the TPC will monitor the site.

6.2 Travel Plan Co-ordinator (TPC)

The assigned TPC will be responsible for overseeing the implementation of the objective and targets presented in chapter 5 by:

- Working with the Mine to organise shift patterns by residential location to facilitate car-sharing where possible;
- Assist the site in setting up a cycle to work scheme for staff;
- Designing and implementing effective marketing and awareness of local public transport;
- Developing, implementing and monitoring the Travel Plan;
- Co-ordinating the monitoring and review programme; and
- Ensuring efficient and effective use of time and resources.

The role of the TPC will be to establish the Travel Plan to ensure that it becomes an effective tool for staff at the Mine.

6.3 Travel Plan Monitoring

This Travel Plan will be formally monitored for a minimum of five years and will involve three monitoring surveys to establish if the targets are being achieved. These are anticipated to occur in Years 1, 3 and 5.

The results of the travel survey questionnaire provide a baseline for future monitoring. Monitoring surveys will principally seek to establish a mode share comparison, year on year, whilst also containing key indicators on impacts such as cycle parking occupancy levels/satisfaction levels and uptake of the measures contained within this document.

Monitoring should be undertaken within the same week each year where there are no exceptional conditions, such as school holidays, bank holidays, transport service disruption etc. and submitted to the North York Moors National Park Authority for sign off.

Appendix A
Questionnaire

Boulby Mine:
Travel Plan Questionnaire for Staff

The aim of this questionnaire is to understand the modes of travel that staff currently use to commute to and from work and the reasons for doing so. With your help we will identify ways to encourage staff to utilise sustainable modes of travel like cycling, car sharing and public transport as viable modes of transport. All information is strictly confidential and will not be used for any purpose apart from that specified above.

Please could you spend a little time filling in the questionnaire below:

Surname:

Role:

Home postcode:

Q1. On an average week, what time do you usually arrive and leave work?

	Time In		Time Out		Not Applicable (If you do not usually work these days)
	Hour	**Minute**	**Hour**	**Minute**	
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					
Saturday					
Sunday					

Q2. Your current contract type

Please tick one	
Full Time	
Part Time	
Rotational Shift	

Q3. Your current employment status

Please tick one	
Permanent	
Contract	
Agency	
Seasonal	

Q3. Do you have a disability that affects your travel options?

Please tick one	
Yes	
No	

Q4. What is your principal mode of transport?

The mode of transport you use most often to cover the longest distances of your journey.

Please tick one	
Drive car alone	
Car share as driver	
Car share as passenger	
Dropped off	
Motorcycle	
Taxi	
Bus	
Cycle	
Train	

If you use more than one mode of transport, please see question 5, if not, skip ahead to question 6.

Q5. In addition to your principal mode of transport (question 4) what other method/s do you use?

Drive car alone	
Car share as driver	
Car share as passenger	
Motorcycle	
Taxi	
Bus	
Cycle	
Walk	
Train	
None	

Q6. Considering your answer to question 4 (your principal mode of transport) why do you use this mode?

If there is more than one reason, please number them on a sliding scale with 1 being most important	
Convenience	
Cost	
Satisfy work commitments	
Environmental reasons	
Other commitments on top of your commute (Dropping/collecting/caring)	
Time saving	
Availability	
Personal safety	
Health/fitness	
Other	

Q7. This question is in 3 parts.

What could be done to encourage you to travel by a sustainable mode of transport?

Q7a. Public Transport

If there is more than one reason, please number them on a sliding scale with 1 being most important	
Subsidised/cheaper fares	
Interest free loans for season ticket purchase	
Up to date travel information at work (routes, times & fares)	
More frequent services	
More reliable services	
Less crowded services	
Nothing would encourage me	
Other	

Q7b. Cycling

If there is more than one reason, please number them on a sliding scale with 1 being most important	
Secure/covered parking at work	
Improved shower facilities	
Improved locker facilities	
Discounts/loans/schemes to buy bicycles/equipment	
Advice/training	
Bicycle repair facilities/service	
Information on cycle routes	
Nothing would encourage me	
Other	

Q7c. Car sharing

If there is more than one reason, please number them on a sliding scale with 1 being most important	
Help in finding those with similar work/travel patterns	
Preferential parking	
Nothing would encourage me	
Other	

If you work in a mine-based role, please submit your questionnaire now.

If you work in an office-based role, please answer the following question.

Q8. Please indicate if you use the options below in your role. If not, how likely would you be to use them if they were introduced.

	Currently do so	Very likely	Possibly likely	Not likely
Telephone conferencing				
Video conferencing				
Flexi-working				
Home-working				

Cleveland Potash Ltd

Boulby Mine Planning Application

Response to NYMNPA queries

Wood Environment & Infrastructure Solutions UK Limited – May 2020

Report for

David McLuckie
External Affairs Manager
Cleveland Potash Ltd
Boulby Mine
Loftus
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TS13 4UZ

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Doc Ref. 40513-WOOD-XX-XX-RP-T-0001_A_1

document1

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Document revisions

No.	Details	Date
1	Draft	Apr 2020
2	Final	May 2020

Executive summary

Purpose of this report

This report has been produced for the purpose of answering a number of queries that have been raised by North York Moors National Park Authority, and some consultees, in response to the planning application submitted in October 2019 for an extension to the life of Boulby Mine.

Contents

1. Introduction

1.1.1.1 A planning application (ref NYM/2019/0746/MEIA) was submitted to North York Moors National Park Authority (NYMNPA) in October 2019. Subsequently NYMNPA and some consultees to the application have raised a number of queries and clarification requests. This report provides answers from ICL Boulby to these queries.

1.1.1.2 It is understood that NYMNPA have also commissioned Savills to undertake a review of certain elements of the planning application, but to date these reviews have not been issued and it is not known if additional responses will be required from ICL Boulby to these.

1.1.1.3 In addition, Savills have also undertaken a review of the Environmental Statement, which was used as a basis of a Regulation 22 request for further information under the EIA Regulations. Responses to that request are being provided under separate cover to avoid any confusion between the EIA requirements and more general queries.

2. Queries and responses

2.1 Proposed timelines

2.1.1.1 Within the application, it is proposed that the mine as a whole would continue to operate for a 25 year period, but within this timeframe that there would be an initial period of 10 years where certain buildings and structures are removed from the Mine Site as the processing procedures for polyhalite are refined and new facilities for the processing are able to be designed and constructed outside of the National Park. The application also proposed that within this 10 year period, confirmation would be able to be provided as to when the main plant building would be able to be reduced in size and when the associated stack could be removed.

2.1.1.2 Discussions with NYMNPA have raised concerns over this 10 year period, and a request has been made to reduce this phase of the planning application to as short a period of time as possible.

2.1.1.3 ICL Boulby acknowledge that the scale of the Mine Site creates a number of significant effects on the local area and that the change from sylvinite extraction and processing, to polyhalite provides an opportunity to reduce the scale of the built development at Boulby Mine. The following sections provide information on what needs to happen from an operational perspective to allow structures to be removed or reduced in size at Boulby Mine (sections 2.1.2 and 2.1.3) and a revised timeframe for these changes to happen (section 2.1.4).

2.1.2 Operational requirements

2.1.2.1 In order for ICL Boulby to change its working operations from a position where all of the extraction of minerals and processing occurs at Boulby Mine, to one where extraction can continue at Boulby Mine but the bulk of processing activities occur at a location outside of the National Park a number of activities must be undertaken:

- Removal of buildings structures that are no longer required at Boulby Mine in the future.
- Design and construction of a replacement office building and then the removal of the current building in its 'outlying' position.
- The processing requirements for a new facility to be confirmed.
- A site for a new processing facility outside of the National Park obtained, and the new facility receiving planning permission, and being designed and constructed.
- Operations phased out at Boulby Mine and over to the new facility.
- Removal/reduction in scale of relevant remaining buildings and structures at Boulby Mine.

2.1.2.2 The first 3 bullet points can all be undertaken concurrently to some degree. The key activity to allow processing to be moved to a new location is bullet point 3 - the confirmation of processing requirements. The current position regarding processing requirements is outlined here.

2.1.3 Polyhalite processing

2.1.3.1 Polyhalite is a new product in minerals market, with Boulby Mine being the only facility in the world to be producing the product. Extraction of polyhalite has been occurring since 2010 at Boulby Mine, with the early years of extraction attempting to understand the completely different complexities of mining this material, compared to sylvinite, with no history of previous developments to draw on. More recent years have seen a move to increase production, as mining

techniques have become better understood, and to determine how polyhalite can be used with other minerals to create different products.

2.1.3.2 Polyhalite in its raw from can be simply processed by crushing and grinding to obtain the relevant size of granules for sale and a proportion of polyhalite extracted going forward will go down this route and be sold as Polysulphate. However, ICL has also looked at the upgrading of polyhalite to more recognisable forms of potash, such as potassium sulphate (and even potassium nitrate and other more obscure products). Although it looks simple on paper, the lab and pilot scale test works proved that it is not economically feasible to do anything much with polyhalite other than to simply crush and screen it in its raw form, or to attempt to blend it with other supplementary fertiliser components (to create PotashpluS for example).

2.1.3.3 ICL has conducted extensive market and laboratory test work programmes but unfortunately many of the blending compounds that work in the laboratory and even at the test scale have failed to scale up in full sized production. Problems have also arisen when bulk loads of products are transported, and further problems arise when products are stored and subsequently applied. Therefore, the traditional route within R&D of laboratory scale – pilot scale – full production is not applicable to this product. ICL has therefore had to undertake the more expensive and protracted route of undertaking trials at 'full production' scale within the facilities at Boulby Mine. Understanding how the processing of polyhalite with other materials to form successful products is key to understanding the design requirements of any new processing facility outside of the National Park. ICL therefore need to continue with these trials until they can find the right blend of components and binders together with pre-heating temperature and compressive pressure in the compaction circuit that can create the granules of Potashplus (and potentially other products) that survive transport storage and application.

2.1.3.4 It is for this reason that the planning application originally had a 10 year period for the phasing out of processing works at Boulby Mine and onto a new site. The design and build of a new processing facility away from the Mine Site will require a considerable investment from ICL Boulby in terms of land purchase, design, planning/EIA and construction. It is therefore essential to ICL Boulby that they have a firm understanding of the processing requirements for their planned products, in order that any such facility is designed and built to be able to provide these requirements. ICL Boulby have reviewed the progress of their processing trials against NYNPA's comments on this matter and therefore propose a revised timeframe for this phase of works.

2.1.4 Revised programme

2.1.4.1 The current planning permission permits operations to continue until 2023, and then requires the Mine Site to be restored by 2025. If a planning permission was to be granted in 2020 the following programme for reconfiguration at Boulby Mine is proposed which considers these dates, but also fits in with the timeframe needed to work through the activities identified above in section 2.1.2.

Within 3 years (2023)

2.1.4.2 Within 6 months of a planning permission being granted the raw ore silo, 2000 tonne bunker and associated conveyor structures can be removed.

2.1.4.3 The new mine office/workshop building is to be constructed. It is proposed that an 'outline' approval would be granted under the main planning application for the parameters identified, with the details of the design then to be confirmed through conditions.

2.1.4.4 The sports dome will also be removed over this period.

2.1.4.5 During this 3 year period, polyhalite processing procedures are refined and confirmed to allow work to commence on the design of a new processing facility and the new location to be identified and obtained.

Next 2 years (2025)

2.1.4.6 Once the new office/workshop building is constructed, the current office/admin building and remaining workshops/ancillary buildings within the northern part of the Mine Site will be removed and operations switch to the new building.

2.1.4.7 All of the land in this northern part of the Mine Site will be cleared and restoration works undertaken to create a series of agricultural and nature conservation areas in accordance with the principle of the restoration plan included in the planning application.

2.1.4.8 Construction of the new processing facility will commence.

Next 2 years (2027)

2.1.4.9 Processing operations will switch to the new facility and the importation of Muriate of Potash (MOP) and processing operations (other than simple crushing and grinding) will cease at Boulby Mine. The stack connected to the plant building will be demolished. Internal strip out and deconstruction of those areas of the plant building which are no longer required will take place, leading to the plant building itself undergoing deconstruction / reduction in size at the appropriate time.

Overall 25 year period

2.1.4.10 The construction and set up of a replacement operational plant away from Boulby Mine will involve a substantial investment by ICL Boulby and from a commercial perspective they need to have confidence that they will have then be able to operate the plant for a period of time in order to re-coup the investment. The full 25 year period in which polyhalite can be extracted and sold into the market therefore will provide reassurance to ICL Boulby that they can operate and return profit on their investment.

2.2 APCR blocks

2.2.1.1 The potential use of APCR blocks is mentioned in ES section 12.5, and the presumed regulatory requirements discussed. If the discussions with the Environment Agency result in the expected 'End of Waste' designation, then the blocks will have no classification as a waste material of any type. In simple terms the waste APCR product will have become a standard construction material. All of the processing from APCR to the block form will be undertaken off-site and at Boulby Mine the blocks will simply be off-loaded and then taken underground for use. In this respect they would be the same as any steel beams or concrete blocks used for engineering purposes underground. If the APCR blocks are not classified as a waste material, then no waste planning permission or DCO will be required and therefore the use of the blocks is not specifically applied for within the planning application. In addition, the transport of the blocks to the Mine Site will utilise existing rail transports so no additional rail or HGV movements will be required.

2.3 Veracity of polyhalite resource

2.3.1.1 A separate document produced by Timothy Daffern of ICL is provided alongside this submission. The document is a confidential document as it provides commercial information which is sensitive to ICL Boulby's business and as such should not be made available in the public domain.

2.4 Regulatory planning regime for offshore working

2.4.1.1 The regulatory regime for offshore underground mining falls under the responsibility of the Marine Management Organisation (MMO) through the Marine and Coastal Access Act 2009. From ICL Boulby's reading of the Act and discussions with the MMO it is understood that the offshore underground mining activities proposed in this application would only need a licence if the activities have an effect on the seabed. So offshore underground coal mining (e.g. the West Coast Coal Mining project) could need a licence because of the relatively shallow depth of the coal and the chance of subsidence. Polyhalite extraction, with the much greater depth and the extremely low risk of subsidence, will not create any issues for the seabed and would not require a licence.

2.4.1.2 ICL Boulby has therefore provided the appropriate notification to the MMO that the proposed mining activities are an exempt activity. This notification is made online so a copy cannot be easily supplied but it can be found on the MMO's website by searching for reference EXE/2020/00010 in their application portal. It is understood that the MMO has been in discussions with NYMNPA on this matter as well and that they have provided the same advice as ICL Boulby has received (email from Rob Smith dated 23 April 2020).

2.5 Travel Plan

2.5.1.1 A Travel Plan has been prepared and is submitted alongside this document.

2.6 HGV numbers and routing

2.6.1.1 Natural England made a request within their consultation response regarding the traffic numbers to be generated by the proposed development and how this would compare to the current numbers seen from the operation of the Mine. The response to this request was previously submitted to NYMNPA and subsequently forwarded to Natural England for their comments. Copies of this correspondence are appended to this report for reference (Appendix A).

2.7 Section 106 agreements

2.7.1.1 As has been discussed previously it is ICL Boulby's intention to enter into appropriate S106 agreements with NYMNPA when clarity is available on what residual effects remain that require such agreements to be made. It is understood that NYMNPA intend to appoint Savills to undertake some work in regard to the possible agreements, and that ICL Boulby will also be invited to input into this work.

2.7.1.2 Some early work has been undertaken by ICL Boulby internally on this matter and they await further information regarding the Savills input before any further progress is made. It is understood that this is currently on hold while NYMNPA contends with the financial implications to the Authority of the COVID-19 outbreak.

2.8 Clarification on extraction under onshore land

2.8.1.1 It is confirmed that all polyhalite and salt extraction is proposed to take place within offshore areas. Paragraph 3.3.1.1 of the Planning Statement is therefore incorrect and should state that all extraction would take place under offshore areas.

Appendix A
Traffic number information and correspondence from Natural England

09 March 2020
Ref – 40513-Wood-XX-XX-CO-OE-0001_A_1

Wood Environment & Infrastructure Solutions UK Limited
Partnership House
Regent Farm Road
Gosforth
Newcastle upon Tyne NE3 3AF
United Kingdom

Liam O'Reilly
Yorkshire Area Team
Natural England
Hornbeam House
Crewe Business Park
Electra Way
Crewe
CW1 6GJ

Dear Liam O'Reilly

Boulby Mine, Loftus

Wood are acting on behalf of ICL Boulby in regard to the planning application NYM/2019/0764/MEIA currently under determination by the North York Moors National Park Authority. In response to your latter to Mark Hill at the North York Moors National Park Authority dated 18 December 2019, please find below information relating to transport numbers connected wit the planning application NYM/2019/0764/MEIA. Please accept my apologies for the delay in responding to this letter, we have been awaiting further comments from the National Park Authority on the application which we are only just starting to receive.

The transport numbers presented in the planning application show a snapshot of transport movements as of 2017, but as the application explains, mining activity at the mine has fluctuated across many years in response to market demand for the minerals produced at Boulby. The majority of minerals products from the mine are transported by rail, with a dedicated rail line running from Boulby to Teesside. Minerals products exported by road are therefore limited to smaller shipments for more local customers. These road movements are limited by the current planning permission to a maximum of 66 a day, but with a yearly total of 150,000 tonnes.

Transport numbers for deliveries and for staff or visitor journeys are not restricted by the current planning permission and numbers are representative of production levels. The key driver behind the overall transport numbers are the staff journeys as this shows the greatest variance.

During periods of the mine's lifespan, staff numbers have been over the 1000 mark, but in the past decade direct employee numbers peaked at 992 in 2015, were at 651 in 2017 and dropped to a low of 439 in 2019. They then increased to 468 at the beginning of 2020 and are predicted to grow to the 820 mentioned in the planning application by 2023. In addition to the direct employees there will also usually be between 60-80 contractors on site.

Traffic numbers have therefore been extrapolated from the changing staff numbers to provide estimates of traffic movements by 2023. Due to new processing arrangements on site, staff and traffic numbers are expected to be maintained around the same level from 2023 through the duration of the planning permission. Information is also provided below from 2015 to provide some context for how the predicted traffic numbers compare to the historic figures (and not just 2017).

Year	Mineral HGVs	Deliveries (HGVs and LVs)	Staff
2015	58	1182	1093
2017	38	776	718
2019	26	523	484
2023	48	977	903

All figures show daily vehicle movement numbers. So a figure of 2 would relate to one vehicle entering the site and then exiting again.

Of these vehicle movements, approximately 68% of the movements are to/from the west towards Loftus/East Cleveland and Teesside. With 32% travelling east towards Whitby. It is these eastward journeys that have the potential to pass through the North York Moors SPA and SAC. Minerals HGVs travelling east are required to follow a route along the A174 through Hinderwell, before joining the A171 via the B1266. 5.5km of this route pass with 200m of the SPA and SAC. Delivery and staff traffic is not subject to the same requirement and could either follow the same route, or continue on the A174 through Sandsend and into Whitby. The latter option is unlikely to be a route taken by any delivery HGVs due to the steep bank and narrow bridge crossing in Sandsend, but would be feasible for LVs.

It is therefore not possible to confirm the exact vehicle numbers that could pass within 200m of the SPA and SAC from the proposals. An absolute worst-case scenario (i.e. no eastward vehicles pass through Sandsend) would be for 16 minerals HGVs, 312 delivery vehicles and 290 staff vehicles to travel through the SPA and SAC each day. Whilst this would be an increase on 2017 and 2019 numbers, it would be a decrease of 17% from the historic traffic movement seen in 2015 and would be lower still than historic numbers prior to 2010.

I hope that this provides you with the information you need to assist with your consideration of the likely significant effects on the designated sites. If you have any further queries though, please get in touch.

Yours sincerely

Neil Marlborough
Technical Director

Marlborough, Neil

From: O'Reilly, Liam
Sent: 07 April 2020 17:38
To:

Cc:
Subject: FAO Mark Hill RE: Traffic information for Natural England HRA request - NYM/2019/0764/MEIA

Dear Mark and Neil,

Thank you for submitting the additional information regarding the proposed vehicle movements from Boulby Mine and through the North York Moors SAC/SSSI.

Based on the additional information and plans submitted, Natural England considers that the proposed development will not have likely significant effects on the North York Moors SACand has **no objection** regarding impacts to the North York Moors SAC/SSSI.

To meet the requirements of the Habitats Regulations, we advise you to record your decision that a likely significant effect can be ruled out. The following may provide a suitable justification for that decision:

- Using the average baseline between 2015-2019, the increase in AADT will only amount to 157 HGVs and 138 cars traveling through the North York Moors SAC. This is below the standard threshold set by Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations when determining a Likely Significant Effect;
- The figures quoted (in the letter dated 9th March 2020 from Neil Marlborough of Wood plc.) for vehicle movements traveling through the North York Moors SAC are precautionary. This is because they assume that all traffic travelling to and from the East of the proposal will go through the North York Moors SAC (on the A171).
- Under the past permission, staff numbers (and vehicle movements) were significantly higher than the current proposal;
- Case Study F (Atmospheric nitrogen profile for North York Moors SAC) of the Improvement Programme for England's Natura 2000 Sites - Planning for the Future IPENS049 showed that road emissions were not a major contributing factor to nitrogen deposition on the SAC at current;
- Unit 113 (Ugthorpe moor) is intersected by the A171 and is currently in favourable condition;
- Although not directly related to impacts on the SAC, the proposed travel plan may provide some mitigation.

Please note that the advice we provided in our letter (dated 18th Dec 2019), is still pertinent in the determination of this application. In particular, we had **no objection subject to securing conditions** regarding landscape and we also pointed your authority to the standing advice regarding ancient woodland. Please consult the letter for the full details.

If you have any queries relating to the advice in this email or our letter (dated 18th Dec 2019), please contact me.

Kind Regards

Liam

Liam O'Reilly
Sustainable Development Lead Adviser
Yorkshire Area Team
Natural England
Lateral

8 City Walk
Leeds, LS11 9AT

To prevent the spread of coronavirus (COVID-19) I am working from home, please send any documents to me by email during this time. I am also working reduced hours due to childcare commitments.

Get environmental advice on your pre-application planning proposals using our chargeable advice service.

We are here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

From: Marlborough, Neil
Sent: 18 March 2020 11:32
To:
Cc:

Subject: Traffic information for Natural England HRA request

Mark

Please find attached information regarding the proposed traffic numbers from Boulby Mine, and how they relate to historic numbers through the designated sites on the North York Moors. This has been provided in response to the consultation comments received from Natural England and Liam O'Reilly from NE has been copied in here.

Regards

Neil

Neil Marlborough
Technical Director, Planning and EIA
Wood Environmental & Infrastructure Solutions UK

wood.

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Cleveland Potash Ltd

Boulby Mine Night-time Assessment

Wood Environment & Infrastructure Solutions UK Limited – July 2020

Report for

David McLuckie
External Affairs Manager
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Doc Ref.

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Document revisions

No.	Details	Date
1	First issue	30/07/20

Contents

1. Introduction

1.1 Aims of the study and background

1.1.1 This report has been compiled by Wood Environment & Infrastructure Solutions UK Ltd ('Wood') and identifies, predicts and evaluates the potential night-time effects arising from the proposed continued operation, then decommissioning and restoration of Boulby Mine, (the "Proposed Development") in the context that the present Mine's operations would otherwise cease in 2023 and the agreed restoration works would then be implemented under the present planning permission (NYMR/003/0043B/PA). The Night-time Assessment has been undertaken in accordance with relevant guidance for undertaking landscape and visual assessments in the UK that is provided by the *Guidelines for Landscape and Visual Impact Assessment, Third Edition* (Landscape Institute and Institute of Environmental Management & Assessment [LI and IEMA], 2013), hereafter referred to as GLVIA3.

1.1.2 The background to this study is the recent planning application (NYM/2019/0746/MEIA) to extend the working life of the mine and the request by NYMNP to undertake an assessment to understand how the operational mine would affect the night-time environment.

1.1.3 The Night-time Assessment is intended to supplement the original Landscape and Visual Impact Assessment submitted as part of the planning application and follows a similar methodology. The assessment has focused on four Night-time Assessment viewpoints which have been selected and agreed with the North York Moors National Park Authority (NYMNPA). Site survey within the 5km study area has also been undertaken to understand the baseline night-time environment and to inform the assessment.

2. Policy, Guidance and Scope of Assessment

2.1 Policy and Guidance

2.1.1 The following documents have been considered to establish the local policy context and to inform the lighting design, Night-time Assessment and mitigation measures:

The Development Plan

North York Moors Draft Local Plan

2.1.2 The Inspector's Report has been published on the draft Local plan following the examination in Public, and the Report is found to be generally sound (subject to some minor modifications). The national park Authority is proposing to adopt the draft Local Plan at a meeting on the Authority at the end of July 2020. Given this situation, the draft Local plan can be given substantial weight in the decision making process. The draft Local plan contains the following policy which is of direct relevance to the Night-time Assessment of the Proposed Development: *Policy ENV4: Dark Night Skies.*

Policy ENV4: Dark Night Skies

2.1.3 Policy ENV4 relates to the aim of maintaining dark night skies in the National Park by minimising light spillage through appropriate design and management. Section 2 of the policy states that

"In Open Countryside proposals that involve external lighting will only be permitted where it can be demonstrated that the lighting is essential for safety or security reasons and the lighting details meet or exceed those set out in any lighting guidelines adopted by the Authority."

The rationale for the policy relates to the recognition of being able to experience dark skies as one of the National Park's *'special qualities'*. The relatively low levels of light currently present within the National Park allows people to experience the quality of the night-time environment and this also has implications for a growing recreational pastime (stargazing) relating to appreciation of the night sky. The policy also states that, in the case of works to existing development, "*applicants will be encouraged to bring all existing external lighting up to the standards set out in any lighting guidelines adopted by the Authority"*.

Planning Practice Guidance

PPG Light Pollution

2.1.4 The Planning Practice Guidance (PPG) in relation to light pollution identifies a number of issues in relation to *'light pollution'* or *'obtrusive light'*. Specifically, the PPG states that light pollution can, "*undermine enjoyment of the countryside or the night sky, especially in areas with intrinsically dark landscapes"*. A number of considerations are identified in relation to the local context and how the lighting scheme will affect the local landscape or be perceived by users of facilities and spaces within the night-time environment. Specific reference is made to the location of development in areas which could be considered to be an *"intrinsically dark landscape where new lighting would be conspicuously out of keeping with local nocturnal light levels, making it desirable to minimise or avoid new lighting"*.

2.1.5 The PPG states that "*light intrusion occurs when the light 'spills' beyond the boundary of the area being lit*" and general recommendations are also provided in relation to the appropriate characteristics of a lighting scheme as follows:

- *"Lighting near or above the horizontal is usually to be avoided to reduce glare and sky glow (the brightening of the night sky);*
- *Good design, correct installation and ongoing maintenance are essential to the optical effectiveness of lighting schemes such as fixed and/or regularly operated functional and decorative lighting elements;*
- *In combination with optical good practice aimed at limiting light pollution, efficient lamp and luminaire selection are important considerations to minimise energy use and associated carbon emissions;*
- *Lighting schemes could be turned off when not needed ('part-night lighting') to reduce any potential adverse effects - e.g. when a business is closed or between midnight and 5am or 6am. Planning conditions could potentially require this where necessary;*
- *Lighting could also be dimmed to minimise its visual impact at times of reduced need or increased sensitivity; and*
- *Impacts on sensitive ecological receptors throughout the year, or at particular times (eg during bird migrations) may be mitigated by the design of the lighting or by turning it off or down at sensitive times."*

2.1.6 The PPG states, "*that lighting schemes for developments in protected areas of dark sky or intrinsically dark landscapes need to be carefully assessed as to their necessity and degree*". Light colour is also discussed in relation to effects on wildlife and people. White light with higher levels of blue content is generally more detrimental to wildlife and also to people in relation to sleep disruption. There is the potential to use white light sources which filter the blue and ultraviolet elements of lighting.

North York Moors National Park Management Plan (A Wider View)

2.1.7 The management plans sets out a vision for the National Park and defines it's *special qualities* which includes:

"Dark skies at night and clear unpolluted air".

The management plan acknowledges that the potential for increasing levels of light pollution within the National Park is a *challenge*.

2.1.8 A number of policies are also set out including policies E19 to E24 under the aim that;

"the North York Moors will continue to be a place of tranquillity, remoteness and dark night skies, providing opportunities for spiritual refreshment".

Policy E20 specifically relates to dark skies and states that:

"Dark skies will be protected and improved. New development in the National Park will not cause unacceptable light or noise pollution".

2.1.9 The management plan identifies a mechanism to implement policies. In relation to Policy E20 implementation would be achieved through the Local Development Framework Core Policy A.

North York Moors Design Guidance

2.1.10 The NYMNP Design Guide, parts 1 to 5, is provided as a supplementary planning document.

2.1.11 Part One: General Principles discussed the issue of 'landscape setting' and recommends that for proposals within countryside locations consideration should be given to, *"the use and potential impacts of external lighting"*.

2.1.12 Part Three: Landscape defines light pollution as, *"artificial light that is allowed to illuminate or pollute areas that are not intended to be lit"*. In relation to security lighting the guidance provides a range of measures that should be considered to reduce the potential impacts of lighting. These include;

- Power;
  - Limiting the power of lighting to 150W.
- Movement sensors;
  - Installation of movement sensors to reduce the time lighting is present.
- Timers;
  - Use of timers to limit the amount of time lighting is present.
- Aim of light;
  - Lighting should be directed towards the required area of illumination. *"To keep glare at a minimum the angle of light should generally be kept below 70°"*.

This section concludes by stating that, *"Inappropriate or ill considered lighting has the potential to create unacceptable light pollution - particularly in the predominantly dark areas of the park."*

2.2 Scope of Assessment

Limitations in the Preparation of the Night-time Assessment

2.2.1 Night-time viewpoint photography and site survey work for the LVIA was predominantly carried out during periods of dusk in the spring and early summer of 2020. Photography was undertaken within the time period ~30 - 90 minutes after sunset during periods of semi-darkness. The appearance and intensity of lighting within the site as perceived from the surrounding landscape would vary depending on the prevailing atmospheric conditions and time of night. It is also anticipated that visibility of the Proposed Development would be marginally increased during the winter months from some viewpoints when some species will be totally devoid of leaf cover.

Spatial and Temporal Scope

Spatial Scope

2.2.2 The spatial scope of the assessment of night-time impacts covers the Proposed Development site, and the detailed and defined night-time study areas as shown in **Figure 1**.

Temporal Scope

2.2.3 The temporal scope of the LVIA reflects the programme for the Proposed Development as set out originally in Section 3.3 of the ES, and subsequently in Section 2 of the 'Response to NYMNPA

queries' report (Wood, may 2020) submitted alongside this assessment.. The Proposed Development would require the present mining activities to extend 25 years beyond 2023 i.e. until 2048. During this period some of the present buildings, plant and infrastructure, and associated lighting, would remain in place and operational. The Proposed Development has been split into three phases for the purposes of the LVIA and Night-time Assessment:

Phase 1 – assumes planning permission is granted in 2020 and lasts until 2025. The following structures would be decommissioned and removed:

- Centrifuges and belt filter building connected to the potash treatment plant;
- Oil storage building and tanks;
- Sports dome and construction store;
- 2,000 tonne surge bunker, and associated conveyor belts;
- General stores building;
- Administration building;
- Old boiler house; and
- Engineering services building.

The structures to be removed would be concentrated in the northern part of the Proposed Development site with the structures' footprints being restored to pasture. A replacement administration building would also be constructed in the southern part of the Mine Site.

Phase 2 – 2025 to 2027. Major processing operations are switched from Boulby Mine to a new facility outside of the national Park, allowing the main stack to be demolished and the existing plant building to be stripped of all redundant plant and the building subsequently reduced in size.

Phase 3 – 2027 onwards. Mining operations would continue until the end of the 25 year planning permission. Upon completion of mining the remainder of the Proposed Development site would be decommissioned and restored.

2.2.4 This proposed timetable results in the assessment of night-time effects of the Proposed Development at three temporal points:

- Operational Phase 2025 – assessment undertaken against the permitted future baseline in which all surface mining plant, structures and buildings and most infrastructure and all permanent artificial lighting sources would be removed. Restoration and aftercare would be completed but planting would be immature e.g. whips and transplants would still be protected by tree shelters (see **Table 1.1**).
- Operational Phase 2033 – assessment undertaken against the permitted future baseline in which restoration seeded and planted areas would have experienced a period of up to ten years' growth and establishment.
- End of Restoration and Aftercare Phases 2056 – assessment undertaken against a permitted future baseline of a matured restored site 31 years after landscape restoration scheme shown in drawing; '*Restoration Proposals*' (Ref. 2274.21, Estell Warren, December 2012) would have been completed.

Predicted Future Baseline

2.2.5 The Night-time Assessment has been undertaken in relation to the same future baseline scenario used in the LVIA a summary of which is provided below.

2.2.6 The future baseline assumes that the present mining activities at Boulby Mine cease in 2023, with subsequent decommissioning and the restoration of the former mining site in accordance with consented restoration plan under planning permission (NYMR/003/0043B/PA). The future baseline for the purposes of the LVIA has been separated into five distinct phases to reflect how the site would evolve in the absence of the Proposed Development. This approach was agreed with the NYMNP in the addendum scoping opinion issued in October 2017 (see **Appendix 1.A**). At the scoping stage, four phases were identified covering the period 2019 - 2048. This time period was chosen to reflect the time period over which the new planning permission for the Proposed Development would be in place. It has been considered necessary to include additional future baseline scenarios to cover the period during which the Proposed Development would be in its restoration, aftercare and maturing period. The dates used have been amended slightly from the scoping discussions in order to be consistent with the Proposed Development programme and therefore provide a clear assessment. The five phases are summarised in **Table 1.1** below, with more detail provided in the technical note included with the Scoping Opinion at **Appendix 1.A**.

Table 1.1 ES Future Baseline

Time period	Baseline description	Comments
2019 - 2023	Operational mine	The current baseline with a continuation of the existing permitted activities.
2023 - 2025	Decommissioning and restoration	Site decommissioning including removal of buildings, plant and associated artificial lighting, making safe all surface and underground areas, site clearance, ground reprofiling, soil replacement, and establishment of surface features including wildflowers, trees and hedgerows, fencing, water features etc.
2025 - 2033	Aftercare	Management and maintenance activities on a restored but immature site.
2033 - 2048	Semi-mature site	A maturing landscape. Given the challenging location and lack of onsite soils, whilst the wildflowers, pasture and hedgerows will have matured by 2048, the new woodland planting can only be considered to be semi mature.
2048 – 2057+	Mature restored site	All aspects of the restored site will have matured.

2.3 Lighting Requirements for the Proposed Development

Lighting Scheme Objectives

2.3.1 A lighting scheme which allows the mine to operate in a safe and functional manner would be provided. Within these overall parameters the lighting provision would be designed to minimise adverse impacts on the local area and the wider National Park.

2.3.2 The objectives of the lighting scheme are as follows:

- To provide illumination to the mine entrance/ junction with the A174 and access road to facilitate safe access by road users and pedestrians accessing the facility by public transport;
- To provide Illumination to areas within the main mine area to facilitate operational requirements during periods of darkness and low light conditions including the safe movement of vehicles, machinery and people;

- To provide illumination to emergency escape routes and gathering areas during periods of darkness and low light;
- Minimise adverse impacts on biodiversity particularly in relation to effects on the local bat population; and
- Minimise light pollution through elimination of unnecessary light sources and reduction of light spill.

2.3.3 To facilitate the operational, safety and security requirements of the mine, which operates on a 24-hour basis, a range of lighting is required and has been used to help define the parameters for the Night-time Assessment as follows:

- Highways lighting to A174 (8 No. lighting columns along approximately 285m of the route) adjacent to mine entrance;
- Lighting on columns to the mine entrance and access road;
- Security and operational lighting associated with individual buildings, structures, external working/storage areas and access/circulation routes.

Mitigation Measures

2.3.4 The mine undertakes an ongoing process of improvements to lighting at the site with the aim of reducing light spill, rationalising lighting provision by removing unnecessary light sources, utilising up to date lighting technology (currently LED lighting) and providing a more uniform lighting environment. It is intended that the current programme of works would result in a lighting environment which would be 'cleaner' and less prominent. Mitigation would include the following measures:

- New lighting units would be light emitting diodes (LED) which allows the emitted light to be more directional, controlled and produced in a narrow beam. The colour temperature of the units would be towards the warm spectrum (<4000 °K) which would have a softer, less harsh appearance and is also considered to be less harmful to bats;
- Lighting colour would be of a relatively, uniform warm white colour which would provide a simpler, cleaner appearance.
- Lighting units would be low level where this is feasible in relation to functional, security and safety requirements;
- Light units would be directional and shielded to minimise light spill;
- Gaps in building cladding would be filled to remove the potential for internal lighting to be perceived externally and pollute the night-time environment;
- The length of time lighting will be operational will be reduced to the minimum required to facilitate the safe and functional operation of the mine. This will be achieved through the use of timing devices and proximity activated lighting where this is feasible and appropriate; and
- A lighting audit will be undertaken to identify redundant or unnecessary lighting provision. this audit will be used to inform the overall design of the lighting strategy and lighting mitigation proposals.

2.3.5 This lighting mitigation programme would run alongside and complement the phased rationalisation of the operational mine and corresponding introduction of the restoration scheme. As part of the operational mine rationalisation a number of buildings would be removed or reduced

in size by 2027. Building removal will provide the opportunity to further reduce the extent and influence of lighting within the operational mine.

3. Methodology

3.1 Methodology

3.1.1 The Night-time Assessment follows the same methodology used for the assessment of landscape, visual and cumulative effects, set out in **Appendix 5A** of the LVIA. The difference is that it has been conducted during periods of dawn or dusk and assesses the baseline night-time environment against the proposed lighting required for the operational mine which form part of the Proposed Development.

3.1.2 The Night-time Assessment is not a technical lighting impact assessment based on quantitative measurement of light levels, rather the assessment relies on professional judgement of what the human eye can reasonably perceive. As with the landscape and visual assessment, the sensitivity of the receptor to the Proposed Development (Boulby Mine night-time lighting environment) and the magnitude of change are combined to determine the level of effect likely to result from the lights. The evaluation of significance and the nature of these effects is also described following the methodology set out in **Appendix 5A**, used for the assessment of landscape, visual and cumulative effects.

Future baseline

Predicted Future Baseline

3.1.3 The future baseline assumes that the present mining activities at Boulby Mine cease in 2023, with subsequent decommissioning and the restoration of the former mining site in accordance with consented restoration plan under planning permission (NYMR/003/0043B/PA). The future baseline for the purposes of the Night-time Assessment has been separated into five distinct phases to reflect how the site would evolve in the absence of the Proposed Development.

Evaluation of Significance

3.1.4 The level of night-time landscape and visual effect (and whether this is significant) is determined through consideration of the 'sensitivity' of the landscape or visual receptor and the 'magnitude of change' which would be brought about by the Proposed Development.

3.1.5 Night-time landscape or visual sensitivity specific to the Proposed Development is ranked from high, through medium to low and the magnitude of landscape or visual change is ranked from high, medium, low to very low as shown in **Table 2.1**. The type of effect is also considered and may be direct or indirect, short, medium, long-term (reversible) or permanent, and positive, neutral, or negative.

3.1.6 The Night-time Assessment unavoidably involves a combination of both quantitative and subjective assessment and wherever possible assessment has sought to gain a consensus of professional opinion through consultation, peer review, and the adoption of a systematic, impartial, and professional assessment approach.

3.1.7 The EIA Regulations require that a final judgement is made about whether or not each effect is likely to be significant. In this assessment the matrix in **Table 2.1** provides an indication of the significance of effects. However, it should also be noted that judgements relating to the significance of individual effects are subject to the interpretation and professional judgement of the

assessor and are not determined solely by use of matrices but are supported by the presentation of clear and accessible narrative explanations of the rationale in accordance with GLVIA3.

Table 2.1 Significance Matrix

Magnitude of change	Sensitivity		
	High	**Medium**	**Low**
High	**Substantial** (Significant)	**Moderate/Substantial** (Significant)	Moderate (Possibly Significant)
Medium	**Moderate/Substantial** (Significant)	Moderate (Possibly Significant)	Slight/Moderate (Not Significant)
Low	Moderate (Possibly Significant)	Slight/Moderate (Not Significant)	Slight (Not Significant)
Very Low	Slight (Not Significant)	Slight/Negligible (Not Significant)	Negligible (Not Significant)

3.1.8

Defining the Study Area

3.1.9 The Night-time Assessment Study Area has been agreed through consultation and is a 5km buffer (or distance) from the site boundary as illustrated in **Figure 1**.

Zone of Theoretical Visibility Plots

3.1.10 The Night-time Assessment is supported by a Zone of Theoretical Visibility (ZTV) plot (**Figure 2**) which illustrates the areas from where, in theory, the lighting would be visible. The ZTV does not take account of the screening effects of buildings, localised landform and vegetation. As a result, there may be roads, tracks and footpaths within the study area which, although shown as falling within the ZTV, are screened or filtered by built form and vegetation, which would otherwise preclude visibility.

3.1.11 The ZTV therefore provides a starting point in the assessment process and accordingly tends towards giving a 'worst case' or greatest calculation of the theoretical visibility.

Night-time Assessment

3.1.12 The Night-time Assessment is also supported by baseline photography from selected viewpoints. These images help to assess the level of night-time visual impact for particular receptors. A range of viewpoints are examined in detail and analysed to determine whether a significant visual effect would occur. By arranging the viewpoints in order of distance it helps to define a threshold or outer limit, beyond which there would be no further significant effects.

3.1.13 The night-time viewpoint analysis involves visiting the viewpoint locations during periods of dawn or dusk and viewing visualisations prepared for each viewpoint location. The fieldwork is conducted in periods of fine weather with clear skies and considers seasonal changes such as reduced leaf cover or hedgerow maintenance.

Establishing the Baseline Night-time Environment or Darkness Survey

3.1.14 During site visits a baseline night-time environment survey or 'darkness survey' is carried out at each viewpoint location. The purpose of the darkness survey is to establish the existing light levels perceived by the landscape architects at the viewpoints and determine their sensitivity to change. The following observations are recorded:

- Areas of darkness with no artificial light;
- Direct artificial lighting (where the light source is directly visible from the viewpoint);
- Indirect artificial lighting (where the light source is not visible but the light emanating from the light source is visible as in the case of 'sky glow');
- Static lighting, for example emanating from a residential property or streetlight; and
- Mobile or transient lighting, for example associated with moving vehicles, trains or aircraft.

3.1.15 Baseline photographs at each of the Night-time Assessment viewpoints are recorded.

Photography and Photomontage

3.1.16 The format for the viewpoint photography and photomontage follows that used for the LVIA to allow comparison between day-time and night-time viewpoints. It is recognised that since the production of the LVIA relevant guidance has been published by the Landscape Institute, *Visual Representation of Development proposals*, *Technical Guidance Note 06/2019*. However, for reasons of consistency between the respective studies the former methodology has been used.

3.1.17 The objective for night-time viewpoint photography is to represent, as far as is practical, the lighting levels as they would be perceived by the human eye. Accordingly, camera settings should be used which best meet this requirement, and settings which artificially brighten the image should not be used. Photography which includes temporary light sources that are not typical or representative, such as passing vehicles on quiet country lanes, should be avoided.

3.1.18 The baseline photography is recorded at either dawn, up to approximately 30 minutes before sunrise or dusk, up to approximately 90 minutes after sunset.

Night-time Photomontage: Rendering of Proposed Lighting Scenario's

3.1.19 It is recognised that the illustration of technically accurate lighting proposals is difficult to achieve and that the photomontages rely on professional judgement and an 'artistic impression' due to the limitations in being able to model light intensity over distance in variable atmospheric conditions of light / darkness. Nevertheless, the photomontages are considered useful when used as a comparison with the baseline photography of the current operational mine and combined with objective data illustrated in the night-time ZTV.

3.2 Consultation

3.2.1 NYMNP largely agreed with the proposed night-time viewpoint locations. It was also suggested that an additional viewpoint was included to illustrate the nature of night-time effects perceived at the western edge of Staithes. An additional night-time viewpoint, N3 Dalehouse Bank, has been included to satisfy this request. Consideration has also been given to the request to include a night-time viewpoint from Cowbar. However, dwellings in Cowbar are situated at a slightly lower elevation and visibility is partially restricted by an area of rising landform immediately to the west of the properties. After further consideration and site survey the viewpoint situated adjacent to the

England Coast Path / The Cleveland Way (day-time viewpoint 4) and in close proximity to Cowbar Lane has been included as a night-time viewpoint (N2) which illustrates visibility from the coastal path network and is representative of higher levels of visibility residents would experience when accessing properties in Cowbar.

Night-time Viewpoint Selection

3.2.2 Night-time viewpoint selection has sought to present the Proposed Development as experienced by a range of receptor groups, from a spread of different directions, and over varying distances. It is to be noted that the viewpoint selection has also been based on where people are most likely to be at night to experience these views. In total 3 night-time viewpoints were selected for illustration from the 10 day-time assessment viewpoint locations, within the 5km Night-time Assessment Study Area. A further Night-time Assessment viewpoint location (Viewpoint N3) was also included in the assessment at the request of NYMNPA. A list of the Night-time Assessment viewpoints is set out in **Table 3.2**

Table 3.2 Night-time Viewpoint Selection

Viewpoint Selection	Distance	Comments
N1. Ings Farm / PRoW 101/3/1 / A174	5m to the north-west of the site boundary	Also, day-time assessment Viewpoint 1 (illustrated in Figure 5.8a,b of the LVIA). Specific location illustrating views available to recreational users from PRoW 101/3/1. Also illustrative of most open views available for residential receptors at Ings Farm and vehicular receptors travelling southbound on the A174. Illustrated in **Figure 3a,b** of the Night-time Assessment.
N2. England Coast Path / Cleveland Way and PRoW 101/202/1	195m to the north of the site	Also, day-time assessment Viewpoint 4 (illustrated in Figure 5.11 of the LVIA). Representative of views available to recreational receptors using the Cleveland Way, PRoW 101/202/1 and Cowbar Lane (also designated as an on-road cycle route). Illustrated in **Figure 4a,b** of the Night-time Assessment.
N3. Dalehouse Bank	960 to the east of the site	Viewpoint included at request of NYMNPA. Not included as day-time viewpoint in LVIA. Representative of views available to residents at the western edge of Staithes. Illustrated in **Figure 5a,b** of the Night-time Assessment.
N4. Roxby Lane	1270m to the south-west of the site.	Also, day-time assessment Viewpoint 6, from the minor road, Roxby Lane, to the northeast of Roxby (illustrated in Figure 5.13a,b of the LVIA). Illustrative of the most open views available to vehicular receptors using Roxby Lane. Also representative of open views available to residential receptors in Roxby. Illustrated in **Figure 6a,b** of the Night-time Assessment.

3.3 Night-time ZTV and Viewpoint Analysis

3.3.1 The Night-time ZTV and viewpoint analysis is used to assist the design and further define the scope of the assessment process. In particular, a threshold or 'limit' indicating the distance from the Proposed Development, within which significant effects may be likely, has been identified. The viewpoint analysis has been supported by field observations across the study area.

Night-time ZTV Analysis

3.3.2 The Night-time ZTV of the Proposed Development were calculated using ReSoft WindFarm computer software to produce an area of potential visibility of the lighting within and associated with the operational mine, calculated at the maximum height of the light source. The ZTV plot provides an indication of the areas from where the lighting may be theoretically visible. They do not indicate the intensity of the lights or take account of intervening screening from localised landform, buildings or vegetation. The ZTV therefore provides a starting point in the assessment process and accordingly tend towards giving a 'worst-case' of the potential visibility.

3.3.3 **Figure 2**: illustrates the ZTV calculated to the anticipated height of the tallest light sources associated within the operational mine area (including the associated highways lighting on the A174 adjacent to the mine entrance) representing theoretical visibility of lighting at 1:45,000 scale across the 5km Study Area. The locations of the Night-time Assessment viewpoints are also shown.

3.3.4 The ZTV illustrates extensive theoretical visibility within the coastal hinterland to the north and east between Boulby and Staithes. This theoretical coverage extends to the east of Staithes but becomes more restricted towards Hinderwell and associated with the A174 corridor and areas of elevated land towards Newton Mulgrave. There is theoretical linear ZTV coverage to the south west along the valley sides of Easington Beck and Roxby Beck and this also extends to the elevated area of land around Roxby up to a distance of approximately 2km from the site boundary. To the north west and west there is theoretical visibility to the A174 corridor, Ings farm and Twizziegill Farm. Beyond this dominant landform, including Rockcliff Hill restricts visibility.

Night-time Viewpoint Analysis

3.3.5 The night-time viewpoint analysis has been conducted from a total of four viewpoint locations illustrated in **Figures 3** to **6**. The night-time views from these locations are illustrated at 90° FoV as baseline photography and photomontages. A summary of the night-time viewpoint analysis is provided in **Table 3.3** and each viewpoint is analysed further in **Tables 4.1** to **4.4**, which includes a darkness survey describing the baseline night-time environment. This assessment has been further supported by the LVIA day-time viewpoints which illustrate annotated baseline photography and in some cases photomontages.

Table 3.3 Summary of Night-time Viewpoint Analysis

Viewpoint Selection	Distance to site boundary (m)	Sensitivity	Magnitude (at year 3)	Level of Effect
N1. Ings Farm / A174	5	High - Medium	High	**Substantial to Substantial / Moderate**
N2. England Coast Path / Cleveland Way	295	High	High	**Substantial**

Viewpoint Selection	Distance to site boundary (m)	Sensitivity	Magnitude (at year 3)	Level of Effect
N3. Dalehouse Bank, Staithes	960	High - Medium	High	**Substantial to Substantial / Moderate**
N4. Roxby Lane	1,270	Medium	High	**Substantial / Moderate**

4. Night-time Assessment

4.1 Significance Threshold

4.1.1 The threshold for significant effects resulting from lighting associated with Boulby Mine based on consideration of the viewpoint assessment and associated site survey work would be restricted to areas within approximately 2Km, with the most distant significant night-time visual effects being experienced from the elevated landscape between Roxby and Borrowby Grange to the south and south east of the site. Within 2km significant visual effects would result from the introduction of a relatively large, horizontal lighting array into the landscape of the future baseline scenario which would be characterised by a relatively dispersed pattern of single point light sources.

4.1.2 Beyond this night-time visual effects would be more limited as a result of the existing presence of lighting in the A174 corridor and the containment provided by elevated areas of landform; Rockcliffe Hill to the north west, Roxby and Borrowby Moor to the south and south east and Beacon Hill to the east.

4.2 Predicted Night-time Landscape Effects

Landscape Character

The study defines several landscape character types (LCT) which are present within the study area and further subdivided into landscape character areas (LCA) as follows.

- 1. Moorland LCT;
  - Northern Moors LCA 1c.
- 4. Coast and Coastal Hinterland LCT;
  - Boulby – Whitby LCA 4a.

Boulby – Whitby LCA 4a

4.2.1 The Proposed Development site is located within the Coast and Coastal Hinterland LCT and more specifically within LCA 4a Boulby - Whitby. Key characteristics of the character area do not specifically mention the night-time environment or dark skies although '*The tall chimneys and structures of Boulby Potash Mine, the deepest mine in Britain, dominate the northern part of the character area.* Reference is also made to the *'busy A174…frequently sited on ridgelines or in very open locations where it has a significant effect on the area'*. Boulby mine along with the A174 also *'detracts considerably from the area'*. The A174 together with the settlements of Staithes, Hinderwell and Ellerby have a strong characterising influence on the night-time environment of the LCA introducing a combination of frequent transient lighting emanating from vehicles on the A174 and dense clusters of varied static lighting sources within the various settlements. At the LCA level the Proposed Development would be introduced within the context of the A174 corridor with associated varied lighting influences.

4.2.2 The sensitivity of this LCA is considered to be *High – Medium*. The LCA is entirely situated within the NYMNP and large areas are within the North Yorkshire and Cleveland Heritage Coast resulting in a *High* Value. The frequent presence of static and transient lighting sources within the A174 corridor reduces the susceptibility of the LCA to change. Susceptibility is considered to be *Medium*.

4.2.3 The Night-time ZTV illustrates that the introduction of lighting as part of the Proposed Development would be theoretically visible over extensive areas of the LCA within the coastal hinterland between Boulby and Staithes and also between Staithes and Hinderwell. The night-time landscape effects would be most strongly perceived between Boulby and Staithes where the introduction of a large scale industrial facility with a relatively dense array of security and operational lighting in an area with a limited number of light sources would be a prominent element in the night-time environment. Further to the east, beyond Staithes, lighting within the operational mine would be perceived in relation to a wider range of existing light sources particularly those in the A174 corridor and would introduce a smaller level of change and be a less influential characterising presence. The night-time influence of the mine would also have a characterising presence on some elevated parts of the LCA further away from the coastal hinterland. The mine lighting would be visible from elevated areas around Roxby, as shown in night-time viewpoint N4 (**Figure 6**), and Borrowby. In Northerly and North Westerly views the mine lighting would be a prominent aspect of the night-time environment from a limited area of the LCA.

Operational Mine – 2025

4.2.4 The magnitude of change would range from *High* to *Medium* within approximately 1.5km resulting in **Substantial to Substantial / Moderate** and Significant effects on the night-time appearance of the *4a Boulby - Whitby* LCA within 1.5km of the Proposed Development. The nature of these effects would be medium-term, direct, and adverse.

Operational Mine – 2033

4.2.5 At year 10 the operational mine would remain a locally strong characterising presence on the night-time environment although the overall reduction of lighting provision, reduced intensity and incremental replacement of units with directional/shielded lighting resulting in a cleaner, more uniform appearance. The magnitude of change would range from High to Medium within approximately 1km and resulting in a **Substantial** and Significant effect on the night-time appearance of the *4a Boulby - Whitby* LCA within 1km of the Proposed Development. The nature of these effects would be long-term, direct, and adverse.

Restored Site – 2056

4.2.6 At this stage perceived change in relation to the future baseline scenario would be limited and occur as a result of the maturation of planting at year 33 which may occasionally be perceptible in the night-time environment. It is not anticipated that there would be any permanent artificial lighting sources within the site boundary. The magnitude of change would be *Very Low* resulting in a Slight effect on the night-time appearance of the *4a Boulby - Whitby* LCA which would not be significant. The nature of these effects would be permanent, direct, and neutral.

Northern Moors LCA 1c

4.2.7 A small part of the *Northern Moors* LCA 1c comprising Borrowby Moor, Mulgrave Moor and Roxby Low Moor is present to the southern extent of the study area.

Key characteristics of the *Northern Moors* LCA 1c includes specific references to dark skies as described in the extract below:

- *"Elevated open expansive upland, part of the Cleveland Hills, forming a gently undulating plateau sloping gradually towards and the western and northern edges of the moors and more steeply towards Eskdale to the south; and*
- *Panoramic long distance views are available across the strong horizons of the moors, across the lower lying areas to the west and north, across Eskdale towards the central moors and towards*

*the coast in the east. The open skies create a dramatic and ever-changing backdrop to the landscape**. At night, the darkness of the skies is a key feature, although to the north of the area this has become eroded by the glow from the Cleveland conurbation**."*

4.2.8 The ZTV illustrates that the LCA is not covered by the area of theoretical visibility of direct light sources within the Proposed Development. Taking a precautionary approach consideration has been given to potential indirect night-time effects resulting from 'sky glow'. Introduction of the mine lighting would result in sky glow which would be perceptible from a limited extent of the LCA. This would generally be perceived in relation to existing light sources particularly emanating from settlements within the A174 corridor and more widely from the Cleveland conurbation to the West / North West. Overall, the extent of intervisibility would be very limited and the characterising influence of the operational mine on the Northern Moors LCA 1c would be minimal and Not Significant.

Landscape Designations

North York Moors National Park

4.2.9 The Boulby Mine's site boundary and much of the on-shore part of the defined LVIA study area lies within the NYMNP. This is a national landscape designation with the statutory purposes '*to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park*' and '*to promote opportunities for the understanding and enjoyment of the special qualities of the Park by the public*'.

4.2.10 As a national landscape designation, the value of the NYMNP is assessed as *High*. The susceptibility of this landscape to change is assessed to be *High* in terms of the underlying landscape character. Taking account of these factors, the overall landscape sensitivity of the NYMNP is assessed as *High*.

Tranquillity and Dark Skies

4.2.1 The NYMNP are currently undertaking a consultation exercise upon tranquillity and how this can be addressed in the proposed update to the Local Plan. The consultation document, *A Sense of Tranquillity, A Strong Feeling of Remoteness and Dark Night Skies* (2017), provides the context and background explaining the need to consider the special qualities of the NYMNP in planning applications. Special qualities of relevance to the Proposed Development are:

- *Tranquillity;*
- *A Strong Feeling of Remoteness; and*
- ***Dark Skies at Night** and clear unpolluted air.*

4.2.2 Lighting associated with the Proposed Development would contribute to the pattern of light glow principally emanating from settlements along the A174 corridor within the coastal hinterland as it does under the current baseline. This pattern can be seen in CPRE's Night Blight Mapping. The incremental increase in lighting levels in comparison with the permitted future baseline is likely to be experienced from within some elevated areas of land beyond the defined LVIA study area, including at Leaholm Moor/Beacon Hill where the valley landscape associated with Easington Beck would allow visibility of the operational mine. In these longer range views the lighting would be perceived in relation to a range of other light sources within individual settlements and the highways network. In closer proximity to the site, in an area extending east to Staithes, west to Ings Farm and Boulby Bank and south west to Roxby, it is assessed that the Proposed Development would perpetuate localised effects with the CPRE maps show existing moderate levels of radiance as consequence of highway and domestic lighting within Staithes, Easington and Loftus. In

comparison with the permitted future baseline scenario in which the mine ceases to operate and the site is restored, the level of effect would be Moderate and Not Significant.

4.2.3 Following completion of restoration the majority of light sources and emissions would be removed and the influence of the Proposed Development would be comparable with that of the future baseline scenario (restoration Year 33). There will be No effect upon this Special Quality during this phase.

North Yorkshire and Cleveland Heritage Coast

4.2.4 Within the study area the Proposed Developed is situated adjacent to the southern boundary of the Heritage Coast and there is consequently potential for this designated landscape to be indirectly influenced. As a national landscape designation, the value of the Heritage Coast is assessed as *High*. The susceptibility of this designation to change is considered to be *High* in terms of the effects upon its relevant key principles. Taking account of these factors, the overall landscape sensitivity of the Heritage Coast is assessed as *High*.

4.2.5 The Heritage Coast Management Plan does not define special qualities but instead defines several key principles. Dark night skies or the qualities of the night-time environment are not specifically referenced, however, the first key principle relates to the conservation and enhancement of the coastal landscape; retention of open landscape character; and retention of extensive, uninterrupted views. In relation to this principle the Proposed Development would introduce a *Low* magnitude of change resulting in a Moderate effect which would be Not Significant.

4.3 Night-time Visual Assessment

The assessment of night-time visual effects has concentrated on the likely introduction of significant effects within the 2km significance threshold as identified in the preliminary viewpoint analysis.

Night-time Viewpoint Analysis

Table 4.1 Viewpoint N1 – Ings Farm / PRoW 101/3/1

Figure 3a-b	**Viewpoint N1: Ings Farm / PRoW 101/3/1** The assessment takes account of a 90° angle of view from this location as illustrated).
Description	**Current Baseline** The viewpoint is situated immediately to the east of the A174 adjacent to PRoW 101/3/1 at an elevation of ~161m AOD and adjacent to the western site boundary. The elevated position of the viewpoint allows extensive visibility across the lower lying landscape to the east which includes views towards the Proposed Development site. The foreground of the view consists of the field boundary hedge and gateway leading to the footpath which is orientated towards the lower elevations of the site through an area of recently planted trees. Beyond the immature trees the land falls away and includes an arable field bounded by a mature gappy hedge. Further to the east a linear grassed bund is lies immediately to the west of the operational mine. Some lower level buildings and associated infrastructure are partially screened by this intervening landform. Beyond this landform much of the western elevation, comprising assorted buildings, chimneys, and infrastructure, is visible as a prominent visual presence in the mid ground of the view. **Future baseline – Restored site** The future baseline scenario would result in removal of existing mine buildings and infrastructure and implementation of the approved restoration scheme. Mine buildings and infrastructure would be replaced by naturalistic elements including native woodland, native scrub and meadow areas.

Figure 3a-b	**Viewpoint N1: Ings Farm / PRoW 101/3/1** The assessment takes account of a 90° angle of view from this location as illustrated).		
	The existing landform introduced to screen the mine buildings and infrastructure will be modified to provide a softer, less engineered form and the topography will progressively slope towards Easington Beck. New surface drainage features will introduce small scale variations to the landform and a mosaic of surface textures.		
Summary of Day-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	High - Medium	High - Medium	High - Medium
Magnitude	High	Low	Very Low
Level of Effect	**Substantial**	Moderate	Negligible
Type of Effect	Medium-term adverse and not significant	Long-term adverse and not significant	Long-term adverse and not significant
Darkness Survey	**Current Baseline – Operational Mine** Notable areas of darkness include the immediate foreground, the elevated landscape of Borrowby / Roxby Moor beyond Ridge Lane and to the north of Roxby. Distant views of elevated areas of moorland on the skyline also illustrate a lack of artificial lighting in this area. Light sources within the existing landscape as perceived from this viewpoint include; • The operational mine; • Staithes and Hinderwell; • Vehicles on the A174; • Occasional isolated dwellings / farms in the elevated landscape to the south / southeast. <u>Operational mine</u> The existing lighting present within the site is concentrated in the main operational mine area and is perceived as an irregular horizontal array above the presence of the intervening screening landform to the west of the railway line. To the northern extent of the mine area street lighting long the access road and lighting along the A174 adjacent to the vehicular entrance is partially visible to the left (north) of the panorama. Many buildings and structures within the operational area are partially illuminated and visible where light sources are orientated towards these structures. The main chimney stack and main plant buildings are visible as a result of this illumination. A range of light sources are visible ranging in colour from bright white to yellow, orange and occasionally red. <u>Staithes and Hinderwell</u> Beyond the mine to the east and south east lighting associated with a number of settlements are discernible. Staithes is the closest of these settlements and the light elements are perceptible in a horizontal array beyond that of the mine. The lighting is of a similar colour range to that present within the mine, although is perceived as being less intense because of the increased distance between the source and the viewpoint. Further to the East along the A174 corridor a cluster of lighting within the village of Hinderwell is visible centrally in the view. <u>Isolated dwellings / farms</u> The upland areas of Roxby Moor and Borrowby Moor define the distant horizon to the right (South) of the panorama. A small number of individual light sources are present beyond the mine and to the south of the A174 corridor depicting the dispersed pattern of farms and single properties in this area. <u>Vehicles on the A174</u> The transient presence of headlights/taillights of vehicles travelling on the A174 would occasionally be visible introducing a source of mobile, direct light. The current baseline level of lighting is assessed as *High*. Lighting from the operational mine is the most prominent influence in the view.		

Figure 3a-b	**Viewpoint N1: Ings Farm / PRoW 101/3/1** The assessment takes account of a 90° angle of view from this location as illustrated).		
	Future Baseline – Restored Site The future baseline scenario would include the removal of all lighting associated with the operational mine and implementation of the approved restoration scheme. It is not anticipated that the site area would include any permanent light sources. Lighting associated with the mine entrance and access off the A174 and bus stops would no longer be required and would be removed subject to approvals by the highways authority. In relation to this view the existing presence of lighting associated with the mine is the most prominent source of illumination and its removal would reduce the future baseline lighting level to *Medium*.		
Night-time Sensitivity	The viewpoint is located within the NYMNP designated for its scenic qualities and quality of dark skies. The value of the viewpoint is, therefore, considered to be High. The view would be experienced by road users (vehicles and occasional cyclists) travelling towards Boulby from the west, users of the public footpath 101/3/1 (although use at night is anticipated to be minimal) and also residents and visitors to Ings Farm / Ings Farm Cottages. The susceptibility is considered to be predominantly Medium with most night-time receptors travelling in vehicles and experiencing at speed as part of a transient sequence of views. The overall sensitivity is assessed as *High - Medium*.		
Magnitude of Change (Proposed Development only)	**Operation - 2025** The lighting associated with the Proposed Development would introduce close range views of a comprehensive and varied lighting array associated with the operational mine and access road. Visible lighting elements within the mine area would extend laterally across the panorama and would be more intense than other lighting perceptible from the view because of the relatively short range between the Proposed Development and viewpoint. The magnitude of change in relation to the future baseline scenario would be *High* resulting in **Substantial** to **Substantial / Moderate** levels of effect which would be Significant. The nature of the effects would be adverse, direct and medium-term. **Operation - 2033** At year 10 a number of buildings and structures and associated lighting, particularly, to the north of the operational mine area would have been removed resulting in a reduction in the overall lighting presence. Lighting associated with the access road and site entrance would still be required. Across the operational area as a whole the lighting provision would be rationalised through implementation of the lighting mitigation strategy resulting in a more uniform, white, light and an overall reduced level of lighting intensity. It is anticipated that growth of the woodland belt to the east of the A174 in close proximity to the viewpoint would result in partially filtered views particularly during summer months. Visibility of lighting would still be available through the branch structure of trees during the winter months. The magnitude of change in relation to the future baseline scenario would be *Medium* resulting in **Substantial / Moderate** to **Moderate** levels of effect which would be Significant. The nature of the effects would be adverse, direct and long-term. **Restoration - 2056** At year 33 the site area would comprise a fully restored, mature landscape with no permanent lighting sources. Perceived change would be associated with the maturation of woodland planting at the A174 boundary which would limit visibility towards the Proposed Development and the wider night-time landscape to the east and south east. The magnitude of change would be *Very Low* resulting in Slight to Slight/Negligible effects which would be Not Significant. The nature of the effects would be neutral, direct and permanent.		
Summary of Night-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	High - Medium	High - Medium	High - Medium
Magnitude	High	Medium	Very Low

Figure 3a-b	**Viewpoint N1: Ings Farm / PRoW 101/3/1** The assessment takes account of a 90° angle of view from this location as illustrated).		
Level of effect	**Substantial** to **Substantial / Moderate**	**Substantial / Moderate** to **Moderate**	Slight to Slight/Negligible
Type of effect	Medium-term adverse and Significant	Long-term adverse and Significant	Permanent, neutral and Not Significant

Table 4.2 Viewpoint N2 – England Coast Path / Cleveland Way

Figure 4a-b	**Viewpoint N2: England Coast Path / Cleveland Way** The assessment takes account of a 90° angle of view from this location as illustrated).		
Description	The viewpoint is situated to the south of the Cleveland Way and also adjacent to PRoW 101/202/2 and Cowbar Lane at an elevation of ~69m AOD and at a distance of ~295m from the site boundary. **Current baseline – Operational mine** Cowbar Lane is visible in the foreground and is set within a flat coastal landscape of grassland and a mix of arable and pastoral fields. The A174 road corridor with associated lighting columns is discernible to the right of the panorama (east). To the right (east) of the panorama the agricultural landscape rises steadily towards Rockcliff Hill and Ings Farm is visible situated amongst mature trees on the skyline. Some existing planting is visible within the site boundary including a belt of willow species to the northern elevation and the woodland to the north west corner adjacent to the A174. Existing mine buildings including the chimney stack, rock shaft tower and main plant building are a prominent visual presence. Lower buildings to the north of the main operational mine including the sports dome, administration building and other ancillary buildings. The various buildings and structures are perceived as a complex juxtaposition of large blocky buildings, tall linear elements and angular structures. The higher buildings/structures are visible above the skyline defined by the elevated landform in the distance to the south west. Beyond the mine development extensive areas of mature woodland are visible set within the Easington Beck valleys and elsewhere within the agricultural landscape. **Future baseline – Restored site** Removal of the mine buildings/ infrastructure and completion of the restoration scheme would introduce a range of softer, naturalistic landscape elements with less prominence of large industrial buildings and structures.		
Summary of Day-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	High	High	High
Magnitude	High	High	Low
Level of Effect	**Substantial**	**Substantial**	Moderate
Type of Effect	Medium-term adverse and significant	Long-term adverse and significant	Permanent adverse and not significant
Darkness Survey	**Current Baseline** Areas of darkness include the flat areas of coastal grassland in the foreground. Rockcliffe Hill is perceived as a predominantly dark, elevated landform punctuated by the occasional presence of lights associated with individual properties. In the distance the skyline to the south west is largely devoid of artificial light sources. Light sources within the existing landscape as perceived from this viewpoint include: • The operational mine; • Individual properties at Boulby, Boulby Bank and Ings Farm / Ings Farm Cottages; and		

Figure 4a-b	**Viewpoint N2: England Coast Path / Cleveland Way** The assessment takes account of a 90° angle of view from this location as illustrated).
	• Vehicles on the A174. <u>Operational mine</u> The horizontal array of lighting associated with the main operational mine features prominently in the view and extends along the access road towards the junction with the A174. The lighting is generally situated at a relatively low level in relation to the larger buildings and structures present in the mine. Lighting ranges across the colour spectrum from bright white to yellow, orange and red. Larger buildings within the mine site would at times be visible depending on prevailing climatic conditions and air clarity partially illuminated by artificial light and set against the dark elevated landform beyond the mine and the night sky. <u>Individual properties at Boulby, Boulby Bank and Ings Farm / Ings Farm Cottages</u> To the right (north) of the panorama lighting associated with the dispersed individual properties which comprise Boulby is visible between the A174 and the coastline. The lighting is more dispersed and less concentrated than that present in the operational area of the mine. This lighting would be perceived in relation to the dark elevated mass of Rockcliffe Hill and Boulby Cliff at the coastal edge. <u>Vehicles on the A174</u> The transient presence of vehicles travelling on the A174 would be occasionally visible and perceived as short lived, mobile and direct light sources. The current baseline levels of lighting are assessed as *High*. The operational mine is the main source of lighting in the view. **Future Baseline – Restored Site** The future baseline scenario would include the removal of all lighting associated with the operational mine and implementation of the approved restoration scheme. It is not anticipated that the site area would include any permanent light sources. Lighting to the mine entrance, junction with the A174 and to illuminate bus stops would no longer be required and would be removed subject to approvals by the highways authority. In relation to this view the existing presence of lighting associated with the mine is the most prominent source of illumination and its removal would reduce the future baseline lighting level to *Low*.
Night-time Sensitivity	The viewpoint is located within the NYMNP designated for its scenic qualities including the quality of dark skies and is also within the North Yorkshire and Cleveland Heritage Coast. The value of the viewpoint is, therefore, considered to be High. The view would be experienced by recreational users of the England Coast Path and the Cleveland Way and is also situated in close proximity to the NCR1 on Cowbar Lane. The susceptibility is considered to be High with most night-time receptors attention being focused on the night-time landscape . The overall sensitivity is assessed as *High*.
Magnitude of Change (Proposed Development only)	**Operation - 2025** The presence of the mine would introduce comprehensive change to the night-time environment in relation to the future baseline scenario. The linear array of lighting would be visible immediately beyond the A174 and would extend laterally across the panorama. The lighting would comprise a range of typologies, intensities and colours and would be perceived in the context of a night-time environment with a relatively limited number of existing light sources. The magnitude of change would be *High* resulting in a **Substantial** level of effect which would be significant. The nature of the effects would be adverse, direct and medium-term. **Operation - 2033** At year 10 a number of buildings and the associated lighting would be removed as part of the mine rationalisation programme. This programme would mainly affect the northern extent of the operational mine area. A corresponding lighting mitigation strategy would also be implemented simultaneously which would reduce light pollution and reduce the overall level of light intensity. The colour range in the mine lighting environment would also be simplified with a predominantly white light being utilised and visible.

Figure 4a-b	**Viewpoint N2: England Coast Path / Cleveland Way** The assessment takes account of a 90° angle of view from this location as illustrated).		
	The magnitude of change would remain *High* resulting in a **Substantial** level of effect which would be significant. The nature of the effects would be adverse, direct and long-term. **Restoration - 2056** At year 33 the site area would comprise a fully restored, mature landscape with no permanent lighting sources on the site. As a consequence, there would be very limited perceived change to the night-time landscape in relation to the future baseline scenario. The magnitude of change would be *Very Low* and Not Significant. The nature of the effects would be neutral, direct and permanent.		
Summary of Night-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	High	High	High
Magnitude	High	high	Very Low
Level of effect	**Substantial**	**Substantial**	Slight
Type of effect	Medium-term adverse and Significant	Long-term adverse and Significant	Permanent, neutral and Not Significant

Table 4.3 Viewpoint N3 – Dalehouse Bank, Staithes

Figure 5a-b	**Viewpoint N3: Dalehouse Bank, Staithes** The assessment takes account of a 90° angle of view from this location as illustrated).		
Description	The viewpoint is situated to a small grassed area to the west of Dale House Bank approximately xxm from the junction with the A174 at the western extent of Staithes at an elevation of ~40m AOD and at a distance of ~960m from the site boundary. The situation of the viewpoint above the wooded Staithes Beck allows views towards the open agricultural landscape to the west. **Current baseline – Operational mine** Large scale buildings and structures within the mine site are visible partially above the containment of the skyline defined by the domed mass of Rockcliffe Hill. **Future baseline – Restored site** Removal of		
Summary of Day-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	High - Medium	High - Medium	High - Medium
Magnitude	High	Medium	Very Low
Level of Effect	**Substantial** to **Substantial / Moderate**	**Substantial / Moderate** to **Moderate**	Slight to Slight/Negligible
Type of Effect	Medium-term adverse and Significant	Long-term adverse and Significant	Permanent, neutral and Not Significant
Darkness Survey	**Current Baseline** Light sources within the existing landscape as perceived from this viewpoint include;		

Figure 5a-b	**Viewpoint N3: Dalehouse Bank, Staithes** The assessment takes account of a 90° angle of view from this location as illustrated).
	• The operational mine; • Individual properties at Boulby and Ings Farm / Ings Farm Cottages; • Individual properties to the north of the A174 including those at Boulby, Red House Farm, • Staithes • Vehicles on the A174. <u>Operational mine</u> Comprising a relatively concentrated, horizontal array of lighting which is perceived below the level of the taller buildings and structures within the operational mine. The array extends from the main operational area to the mine access and entrance at the junction with the A174. Visible lighting ranges in colour from bright white to yellow, orange and red. Larger buildings within the mine site would at times be visible, depending on prevailing climatic conditions and air clarity, set against the night sky and above the dark domed landform of Rockcliffe hill beyond the mine. <u>Individual properties at Boulby and Ings Farm / Ings Farm Cottages</u> Beyond the mine lighting associated with Ings Farm and Ings Farm cottages is visible although not readily perceptibly or strongly influential in the night-time environment. <u>Individual properties to the north of the A174 including those at Boulby, Red House Farm,</u> The low level, dispersed lighting associated with these properties is present within the open coastal hinterland to the north of the A174 <u>Staithes</u> There are close range views of streetlights / illuminated highways signage on the A174 and Dalehouse Bank. The viewpoint is also influenced by the indirect glow and surface illumination emanating from street lighting and properties within Staithes. <u>Vehicles on the A174</u> The transient presence of vehicles travelling on the A174 would also be occasionally visible and introduce mobile direct light sources. This lighting would, at times, be perceived in close range views; headlights for vehicles travelling east towards Staithes and taillights of vehicles travelling west towards the mine. The current baseline levels of lighting are assessed as *High*. The contribution to the current baseline night-time environment of the large number of light sources within the operational mine at a distance of ~1km is balanced by the short-range presence of a smaller number of light sources at the edge of Staithes. **Future Baseline – Restored Site** The future baseline scenario would include the removal of all lighting associated with the operational mine and implementation of the approved restoration scheme. It is not anticipated that the site area would include any permanent light sources. Lighting associated with the mine entrance and access off the A174 and bus stops would no longer be required and would be removed subject to approvals by the highway authority. The removal of lighting associated with the mine would reduce the future baseline lighting level to *Medium*.
Night-time Sensitivity	The viewpoint is located within the NYMNP designated for its scenic qualities and quality of dark skies. The value of the viewpoint is, therefore, considered to be High. The view would be experienced by residents in Dalehouse Bank and road users (vehicles and occasional cyclists) travelling westwards on the A174 towards Boulby. Properties have direct views towards the Proposed Development resulting in a susceptibility for residents which is considered to be *High*. Susceptibility for road users would be Medium. The overall sensitivity is assessed as *High - Medium*.
Magnitude of Change (Proposed Development only)	**Operation - 2025** Introduction of the lighting associated with the operational mine would introduce a densely arranged lighting array perceptible at a relatively low level in relation to taller mine buildings and structure. The visible lighting array would extend laterally across the mine site and would range across the colour spectrum from bright white through to yellow, orange and red. Lighting associated with the mine would be perceived in the context of the relatively limited presence of

Figure 5a-b	**Viewpoint N3: Dalehouse Bank, Staithes** The assessment takes account of a 90° angle of view from this location as illustrated).		
	existing light sources in the rural landscape to the west of Staithes. However, the viewpoint is influenced by the presence of nearby street lighting and lighting within buildings at the western extent of Staithes. The magnitude of change would be *High* resulting in a **Substantial** to **Substantial / Moderate** level of effect which would be significant. The nature of the effects would be adverse, direct and medium-term. **Operation - 2033** Removal of some buildings to the northern extent of the main operational area and consequent removal of lighting combined with the incremental introduction of mitigation measures would result in a reduction of the visual presence and prominence of the Proposed Development within the night-time environment. The magnitude of change would be *Medium* resulting in a **Substantial / Moderate** to **Moderate** level of effect which would be Significant. The nature of the effects would be adverse, direct and long-term. **Restoration - 2056** At this stage there would be no artificial light sources visible within the site boundary and there would be no perceptible change in relation to the future baseline scenario. The magnitude of change would be *Zero* resulting in No Effect.		
Summary of Night-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	High - Medium	High - Medium	High - Medium
Magnitude	High	Medium	Zero
Level of effect	**Substantial** to **Substantial / Moderate**	**Substantial / Moderate** to **Moderate**	No Effect
Type of effect	Medium-term adverse and Significant	Long-term adverse and Significant	N/A

Table 4.4 Viewpoint N4 – Roxby Lane

Figure 6a-b	**Viewpoint N4: Roxby Lane** The assessment takes account of a 90° angle of view from this location as illustrated).
Description	The viewpoint is situated on the western verge of Roxby Lane at an elevation of ~155m AOD and at a distance of ~1270m from the site boundary. **Current baseline – Operational mine** The elevated situation of the viewpoint allows panoramic views across the lower lying landscape to the north west. Broad, interwoven belts of mature, principally, deciduous woodland within Easington and Roxby Becks' feature prominently in these lower lying areas. Pastural fields are intermixed with the woodland. The full extent of the south eastern elevation of the mine buildings is largely visible above the woodland associated with Easington Beck. Beyond the mine the elevated landform of Rockcliff Hill is present with properties at Boulby Barns Farm are just visible on the skyline. The flatter, lower lying coastal plain with the North Sea beyond is visible to the right (north) of the panorama. Some individual properties are just perceptible including those at Red House Farm and Boulby. **Future baseline – Restored site**

Figure 6a-b	**Viewpoint N4: Roxby Lane** The assessment takes account of a 90° angle of view from this location as illustrated).		
	The restoration of the site would introduce a range of naturalistic landscape elements which would become assimilated and the site area would not be perceived as a distinct entity within the wider landscape context.		
Summary of Day-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	Medium	Medium	Medium
Magnitude	High	High	Low
Level of Effect	**Substantial / Moderate**	**Substantial / Moderate**	Moderate
Type of Effect	Medium-term adverse and Significant	Long-term adverse and Significant	Permanent neutral and not Significant
Darkness Survey	**Current Baseline** The foreground landscape, between, Roxby Lane and Roxby Beck is devoid of artificial light sources. The densely wooded valleys of Easington Beck and Roxby Beck which connect into other areas of mature woodland in the wider landscape are perceived as areas of darkness in the night-time environment. Light sources within the existing landscape as perceived from this viewpoint include; • The operational mine; • Individual properties at Boulby and Ings Farm / Ings Farm Cottages; • Individual properties to the north of the A174 including those at Boulby, Red House Farm; • The western extent of Staithes; • Individual properties on Ridge Lane; and • Vehicles on the A174, Roxby Lane and Ridge Lane. <u>Operational mine</u> Lighting present within the operational mine area is perceived as a relatively dense array associated with built elements of constitutes a large proportion of the total visible light sources present in the view. <u>Individual properties at Boulby and Ings Farm / Ings Farm Cottages</u> Lighting associated with Ings Farm and Ings Farm cottages may be occasionally be perceived on the skyline and at the interface with the North Sea coastline on the easterly aspect of Rockcliffe Hill beyond the operational mine. <u>Individual properties to the north of the A174 including those at Boulby, Red House Farm,</u> To the north of the mine there is the occasional presence of individual light sources associated with the dispersed pattern of properties on the relatively flat coastal hinterland and on the lower reaches of Rockcliffe Hill at Boulby Bank. The intervening presence of large buildings and structures within the site area would partially obscure views of some properties. <u>Staithes</u> To the right hand side (east) of the panorama lighting emanating from the western edge of Staithes is partially visible beyond an area of elevated landform in the foreground of the view. <u>Vehicles on the A174, Roxby Lane and Ridge Lane</u> The transient presence of vehicles travelling on the A174 would also be occasionally visible and introduce mobile direct light sources in an elevated situation where the road is routed past Ings Farm and also in the section of the route between Staithes and the mine. This lighting would be perceived in long range views for short periods of time. The current baseline levels of lighting are assessed as *Medium*. Lighting associated with the operational mine represents the strongest influence on the night-time environment.		

Figure 6a-b	**Viewpoint N4: Roxby Lane** The assessment takes account of a 90° angle of view from this location as illustrated).		
	Future Baseline – Restored Site The future baseline scenario would include the removal of all lighting associated with the operational mine and implementation of the approved restoration scheme. It is not anticipated that the site area would include any permanent light sources. The removal of lighting associated with the mine would reduce the future baseline lighting level to *Low*.		
Night-time Sensitivity	The viewpoint is located within the NYMNP designated for its scenic qualities and quality of dark skies. The value of the viewpoint is, therefore, considered to be High. The view would principally be experienced by road users (vehicles and occasional cyclists) travelling northwards on Roxby Lane towards Staithes. Road users attention would generally be focused on the road ahead rather than the wider night-time environment. Susceptibility for road users would be Medium. The overall sensitivity is assessed as *High-Medium*.		
Magnitude of Change (Proposed Development only)	**Operation - 2025** Lighting associated with the Proposed Development into a predominantly rural landscape with relatively low levels of existing light sources would introduce a prominent visual influence in the night-time environment. The magnitude of change would be *High* resulting in a **Substantial** to **Substantial / Moderate** level of effect which would be significant. The nature of the effects would be adverse, direct and medium-term. **Operation - 2033** Reduction in the overall intensity and number of light sources through implementation of the lighting mitigation strategy would result in a reduction of the prominence of the Proposed Development within the Night-time environment. The magnitude of change would be *Medium* resulting in a **Substantial / Moderate** to **Moderate** level of effect which are considered to be significant because of the fundamental change introduced into a predominantly rural night-time environment. The nature of the effects would be adverse, direct and medium-term. **Restoration - 2056** At this stage there would be no artificial light sources visible within the site boundary and there would be no perceptible change in relation to the future baseline scenario. The magnitude of change would be *Zero* resulting in No Effect.		
Summary of Night-time Assessment (in relation to future baseline scenario)	**Operation – 2025**	**Operation – 2033**	**Restoration – 2056**
Sensitivity	High - Medium	High - Medium	High - Medium
Magnitude	High	Medium	Zero
Level of effect	**Substantial** to **Substantial / Moderate**	**Substantial / Moderate** to **Moderate**	No Effect
Type of effect	Medium-term adverse and Significant	Long-term adverse and Not Significant	N/A

Night-time Visual Receptors

XX introduction

Sensitivity of Night-Time Receptors

Sensitivity of night-time receptors within the study area considered during the assessment is set out below:

Residents in Settlements, Property Groups and Individual Properties

4.3.1 Residential receptors are assessed as possessing high susceptibility and there is a high likelihood that these receptors attach a medium or high value to the views that are available from the windows and curtilage of their properties. As such the sensitivity of all residential visual receptors is assessed as High.

Visual Receptors using the Recreational Path Network

4.3.2 Receptors using recreational routes have been assessed as being of High sensitivity on account of their High value as recreational routes and the High susceptibility of the people using these routes, mostly walkers and cyclists, whose attention would be focused on the landscape around them.

Visual Receptors using the Road Network

4.3.3 The sensitivity of receptors using roads is generally considered to be medium, due mainly to the speed of travel and the consequent transient nature of the receptors' views and/or the reduced field of view available to drivers as they concentrate on the road ahead.

Visitors to the NYMNP including Dark Sky Discovery Sites

4.3.4 Receptors using dark sky discovery sites have been assessed as being of High sensitivity on account of their High value as recreational facilities and the High susceptibility of the people using these facilities whose attention would be specifically focused on the night-time environment.

Night-time Visual Effects on the Coastal Hinterland

4.3.5 This area is defined by the A174 corridor and the landscape between the A174 and the North Sea coastline within the 2km detailed study area.

4.3.6 Residents in the dispersed range of individual properties situated between Boulby and Staithes, including those at Boulby, Boulby Grange, Red House Farm and Cowbar Farm would experience significant night-time visual effects as a consequence of lighting introduced to facilitate the operation of the Proposed Development. The lighting would be perceived in relatively close-range views in relation to a future baseline scenario with a relatively limited number of lighting sources. Levels of effect for these residents would vary according to the individual orientation and arrangement of individual properties. However, the influence of the lighting would be widely perceived in the night-time environment introducing a magnitude of change ranging from *High* to *Medium* resulting in **Substantial** to **Substantial / Moderate** levels of effect. Night-time effects at year 10 would remain significant but the implementation of mitigation measures and overall reduction of lighting intensity would diminish prominence. Properties within Cowbar are situated at a slightly lower level than other properties within this part of the coastal hinterland and visibility would be partially restricted by rising landform immediately to the west reducing the night-time visual influence of the mine.

4.3.7 Night-time Viewpoint N3 illustrates the nature of visibility from the western edge of Staithes where a number of residential properties are orientated towards the west and have relatively open views towards the Proposed Development. Some residents would experience a *Medium* magnitude of change resulting in **Substantial / Moderate** effects which would be Significant. This level of effect would be experienced by a small number of residents in a situation where there are a limited number of intervening light sources allowing the lighting associated with the mine to be perceived in relative isolation. More generally across Staithes the frequent, close range presence of a range of

existing light sources (street lighting/residential properties) would dominate the night-time environment and reduce the prominence and influence of lighting within the mine area for these receptors. In this scenario the magnitude of change would be *Low* resulting in a Moderate level of effect which would be Not Significant.

4.3.8 Further to the east, beyond Staithes, night time visual effects would be limited by the presence and influence of lighting within the A174 corridor, particularly Staithes itself, reducing the potential for significant visual effects to be experienced by residential receptors in this area.

4.3.9 There is a comprehensive recreational path network between Boulby and Staithes, including The England Coast Path which shares the route of The Cleveland Way in this area, NCR1 and the PRoW network. It is anticipated that usage of this network during the night-time period would be relatively low in comparison to the day-time scenario. However, recreational receptors will occasionally use this network during night-time and potential effects have been assessed. People using the recreational routes in this area would experience widespread visibility of lighting within the operational mine in relation to a future baseline scenario of relatively low levels of artificial lighting. This would introduce *High* to *Medium* levels of change across this part of the network resulting in **Substantial** to **Substantial / Moderate levels** of effect which would be significant. To the north of Boulby intervening landform would restrict visibility of the site area reducing the potential for walkers to perceive high levels of change. People using the path network to the east of Staithes within the coastal hinterland would not experience high levels of change resulting from the Proposed Development as a consequence of the intervening presence and influence of existing lighting within Staithes.

4.3.10 Vehicular users of the A174 would largely be focused on the road ahead and a relatively limited field of view. In addition, the night-time presence of the mine would generally be perceived in relation to the sequential experience of vehicular users passing through a number of settlements within the A174 corridor which have miscellaneous lighting sources of a scale comparable to that of the Proposed Development. Significant night-time visual effects would be limited to short sections of the route as follows:

- East/southeast bound;
  - Adjacent to Ings Farm/Ings Farm Cottages where short lived transient views would be available at an oblique angle to the direction of travel as illustrated in Viewpoint N1 (**Figure 3a,b**).
  - Adjacent to the mine access and junction with the A174 where short lived transient views would be available of the main operational mine at an oblique angle to the direction of travel and views of the highways lighting associated with the mine entrance and bus stops.
- West/northwest bound;
  - Between Staithes and Boulby where direct open views towards the site are available.

4.3.11 Westbound users of Cowbar Lane would also experience significant night-time visual effects for a short section of the route where it is orientated towards the operational mine adjacent to Red House Farm and the junction with the A174. Viewpoint N2 (**Figure 4a,b**) is situated a short distance ~30m to the north of Cowbar Lane and represents a reasonable illustration of the nature of visibility from this area.

Night-time Visual Effects within the area between Staithes and Roxby

4.3.12 This area comprises the largely elevated landscape to the south of the A174 and Staithes including Roxby, Borrowby Grange, Roxby Lane and numerous individual properties overlapped by the night-time ZTV within the 2km detailed study area.

4.3.13 Residential properties with Roxby are generally not orientated towards the Proposed Development and areas of mature trees associated with St. Mary's Church and Manor House Farm would partially filter views from other areas within the settlement. As a result, night-time visual effects would be limited and Not Significant.

4.3.14 Open views are available from a small number of individual properties/property groups including properties at Oaks Farm/Midge Hall. Direct, relatively close-range views would be available of the western mine elevation with associated lighting array visible in the night-time environment resulting in a *High* magnitude of change and **Substantial** effects in relation to the operational mine at year 3. Substantial effects would continue to be experienced.

4.3.15 Vehicular receptors travelling both ways long Roxby Lane, but particularly in a north easterly direction, would experience occasional visibility of lighting associated with the operational mine during. Views of the wider landscape are largely restricted by the presence of tall mature hedges to the highways boundary for most of the route resulting in limited potential to experience visibility of the Proposed Development. However, occasional open views are available from the route as illustrated in viewpoint N4 (**Figure 6**). Significant effects would be experienced for very short sections of the route where short lived transient views of this nature are available introducing a *High* to *Medium* magnitude of change and **Substantial / Moderate** to Moderate levels of effect. Generally, the visual effects experienced by road users for the majority of the route would be Slight / Negligible and Not Significant.

4.3.16 Residents in some dwellings on Ridge Lane, including Ridge Hall and associated properties, would experience close range but generally filtered views of the mine lighting. The area of mature woodland (predominantly deciduous) in Easington Beck would largely restrict visibility although night-time visual effects are anticipated to be more pronounced during winter months when the trees are devoid of leaf colour. The presence of lighting would often be perceived indirectly through visibility of illuminated surfaces on taller buildings and structures. Magnitude of change would range from Medium to Low resulting in a **Substantial / Moderate** to **Moderate** level of effect which would be Significant. The views of vehicular receptors travelling both ways on Ridge Lane would not be focused on the mine but lighting would occasionally be perceptible in the peripheral vision of road users. Effects would be Moderate / Slight and Not Significant.

Visual Effects on visitors to the National Park

4.3.17 Three sites within the National Park are recognised as 'Dark Sky Discovery Centres' including; the National Park Centres at Sutton Bank and Danby together with Dalby Observatories in Dalby Forest.

4.3.18 There would be no intervisibility between these receptors and light sources within the Proposed Development and consequently there would be no direct night-time visual effects. The potential for indirect effects to be experienced as a result of 'sky glow' emanating from the Proposed Development is also extremely limited. The Proposed Development is situated within the A174 corridor which has a range of existing light sources with existing moderate levels of radiance as recognised within CPRE's Night Blight Mapping. Night-time views towards the north and northwest from the National Park would also be perceived in relation to the presence of sky glow associated with the Redcar and Cleveland conurbations. In the context of these receptors using Dark Sky Discovery Centres it is considered that the very small additional sky glow introduced by the Proposed Development would not be perceptible and there would be no adverse night-time effects.

5. Summary and Conclusion

5.1.1 The night-time effects of the Proposed Development (comparable with the current operational mine) have been assessed in relation to a future baseline scenario of an immature restored site within the current site boundary. It has been found that the geographical influence of the lighting associated with the Proposed Development is relatively limited as a consequence of the visual containment provided by elevated areas of landform including:

- Rockcliffe Hill to the northwest;
- Roxby Moor and Borrowby Moor; to the south and southeast; and
- Beacon Hill to the east.

5.1.2 There are a range of existing light sources within the A174 corridor including settlements and lighting associated with highways which influence the baseline night-time environment. In longer range views from the National Park the Proposed Development would be perceived in relation to this context which has also been found to limit the geographical extent of significant effects.

5.1.3 The threshold for significant visual effects resulting from lighting associated with the operational mine would be restricted to areas within approximately 2km, with the most distant night-time visual effects experienced from the elevated areas to the south and southeast between Roxby and Staithes.

5.1.4 There would be a significant effect on the night-time character of the Boulby – Whitby LCA within approximately 1.5km of the Proposed Development in areas where the influence of existing lighting from the settlement of Staithes and the A174 is relatively limited. This includes the coastal hinterland between Boulby and Cowbar, the elevated area to the south of the A174 and to the east of Easington, a limited extent of Ridge Lane and part of the LCA encompassing the elevated area between Staithes and Roxby.

5.1.5 There would be no significant effects on the National Park *special qualities*, specifically on relation to *'Dark Skies at Night'*.

5.1.6 There would be no significant effects on the *key principles* of the North Yorkshire and Cleveland Heritage Coast.

5.1.7 No other areas of landscape character would be significantly affected by lighting from the Proposed Development.

5.1.8 Significant night-time visual effects would be experienced by the following receptors:

- Residents in a limited number of properties at the western edge of Staithes;
- Residents in a limited number of individual/properties or property groups in the coastal hinterland to the north of the A174 between Boulby and Staithes;
- Residents in a limited number of properties accessed via Roxby Lane and Ridge Lane;
- Recreational receptors using the path network between Boulby and Staithes including short sections of the England Coast Path, Cleveland Way and NCR 1; and
- Vehicular receptors for short sections of the A174 and Cowbar Lane in close proximity to the operational mine.

5.1.9 There would be no significant effects on Dark Sky Discovery Sites at the National Park Centres at Sutton Bank and Danby and the Dalby Observatories.

5.1.10 Mitigation proposals would reduce the overall intensity and influence of the Proposed Development on the night-time environment and utilise a limited spectrum of lighting colour resulting in a cleaner, more unified appearance.

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Key

- Boulby Mine site boundary
- Boulby Mine operational area
- Local authority boundaries
- Line indicating 5km distance from the site boundary
- Lines indicating 2km distance from the site boundary

2km

5km

0 0.5 1 1.5 2 2.5 km

Scale at A3: 1:45,000

Boulby Mine Night-time Assessment

Figure 1
Night-time Assessment Study Area

June 2020

wood.

40513-GOS053

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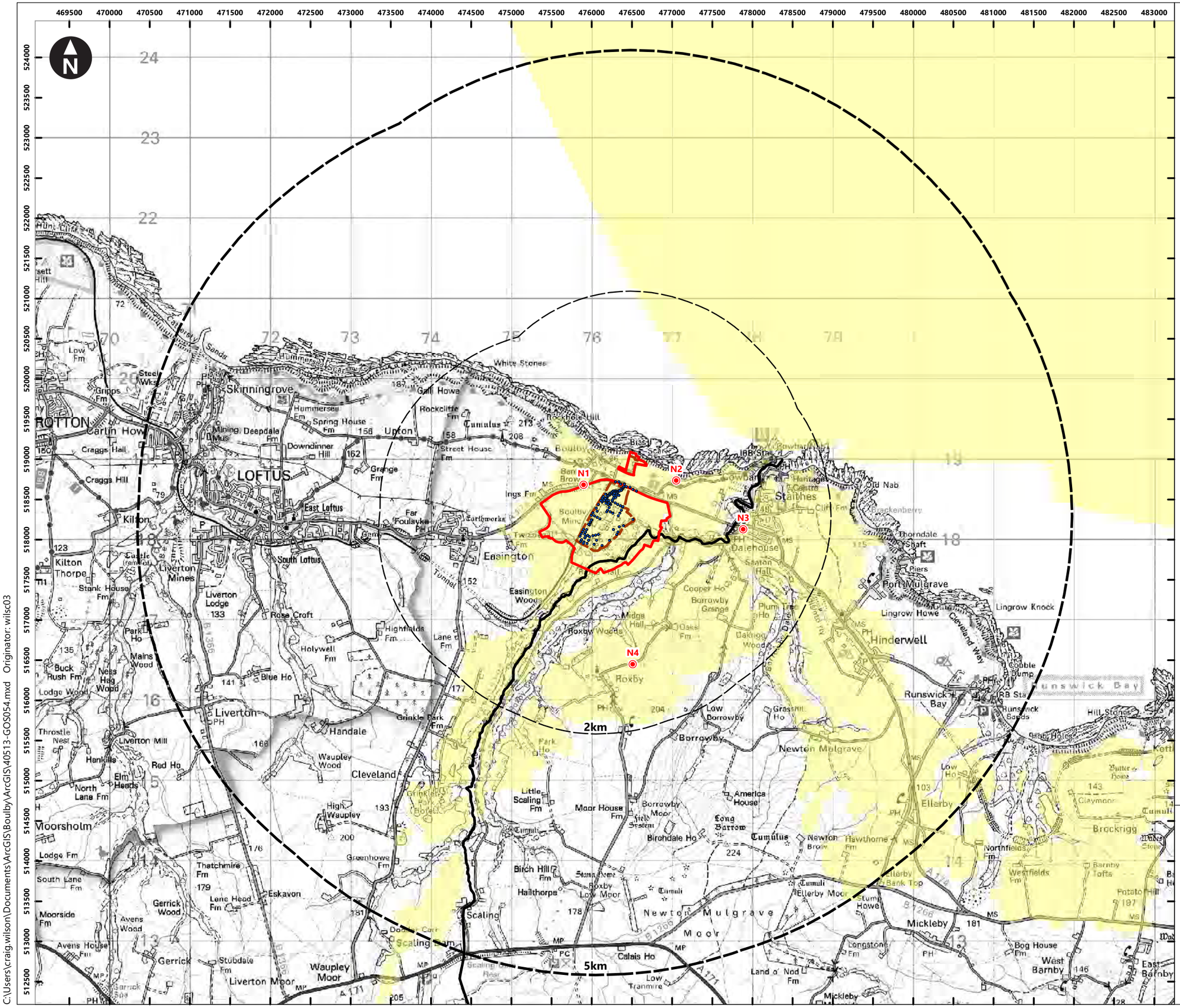

Boulby Mine Night-time Assessment

Figure 2
Night-time Zone of Theoretical Visibility with Night-time Viewpoints (DTM) within 5km Study Area

June 2020

wood.

40513-GOS054

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Note: Correct Viewing Distance: 30cm when printed at A3.

Photograph Parameters Viewpoint 1:

Horizontal field of view	75º (cylindrical projection)	Camera:	Canon EOS 5D Mk II
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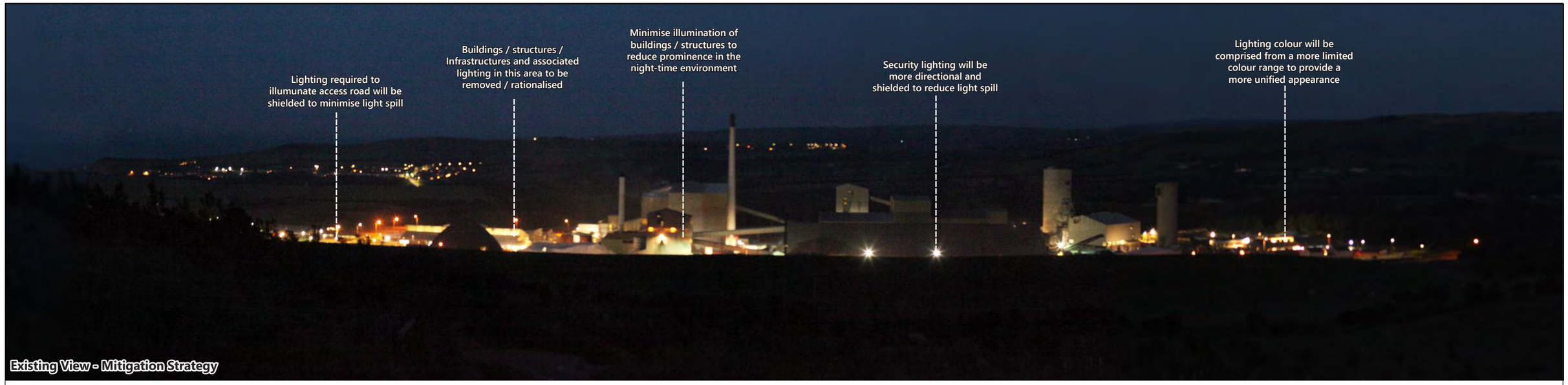
Paper size:	420mm x 297mm (A3)	Camera height:	1.6m AGL
Correct printed image size:	393 x 95mm	Date and time:	24/06/20 23:23

Cleveland Potash Ltd
Boulby Mine New Development

Figure 3a
Viewpoint N1 - Ings Farm / PRoW 101/3/1
Existing Operational Mine Baseline Photograph

July 2020

wood.



Existing View - Mitigation Strategy

Note: Correct Viewing Distance: 30cm when printed at A3.

Proposed Scenario at Year 10

Note: Correct Viewing Distance: 30cm when printed at A3.

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Cleveland Potash Ltd
Boulby Mine New Development

Figure 3b
Viewpoint N1 - Ings Farm / PRoW 101/3/1
Mitigation Strategy and Year 10 Photomontage

July 2020

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Note: Correct Viewing Distance: 30cm when printed at A3.

Photograph Parameters Viewpoint N2:

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Cleveland Potash Ltd
Boulby Mine New Development

Figure 4a
Viewpoint N2 - England Coast Path / Vleveland Way
Existing Operational Mine Baseline Photography

July 2020

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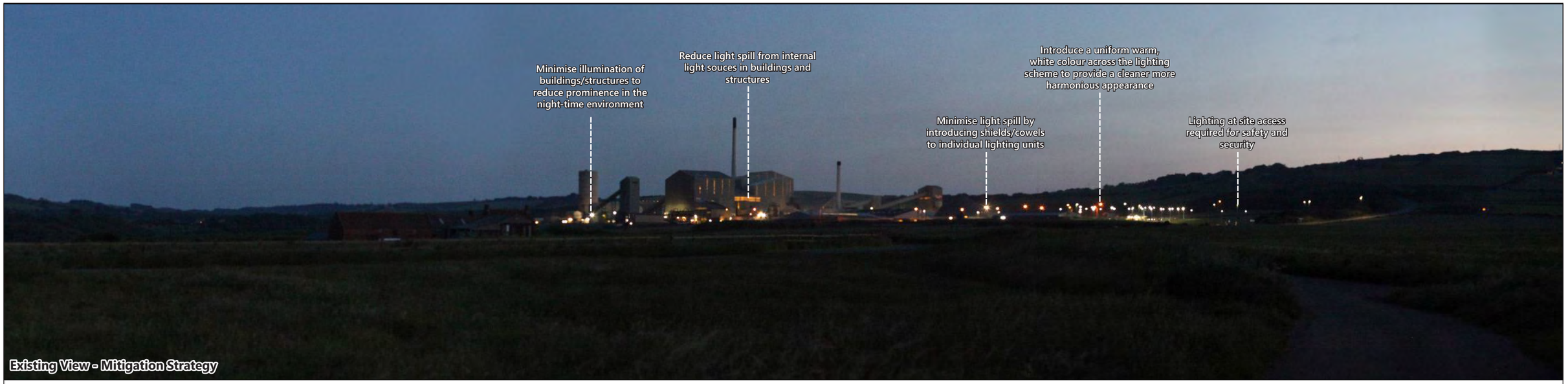

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Note: Correct Viewing Distance: 30cm when printed at A3.

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Cleveland Potash Ltd
Boulby Mine New Development

Figure 4b
Viewpoint N2 - England Coast Path / Cleveland Way
Mitigation Strategy and Year 10 Photomontage

July 2020

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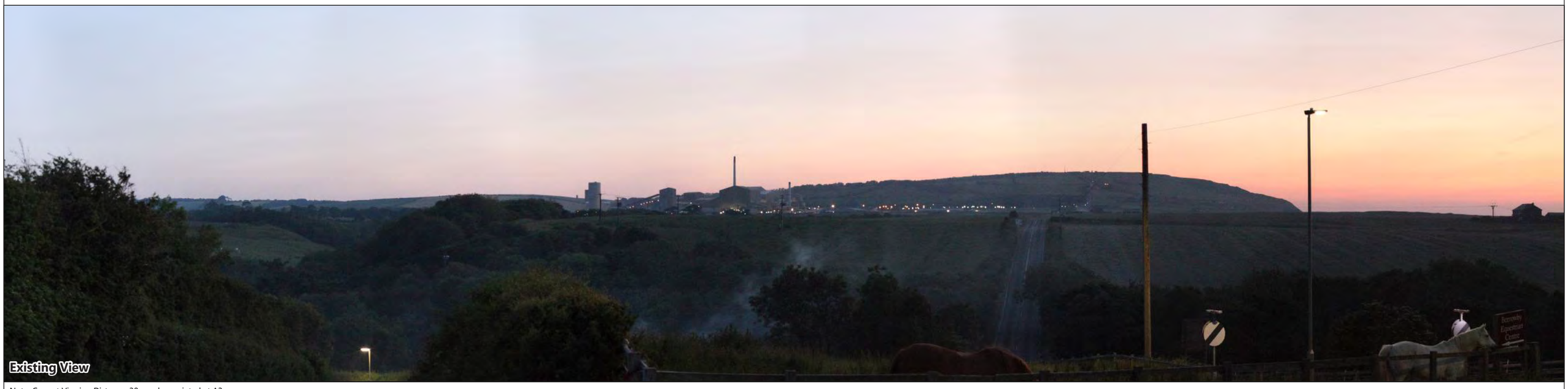

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Boulby Mine New Development

Figure 5a
Viewpoint N3 - Dale House Bank, Staithes
Existing Operational Mine Baseline Photography

July 2020

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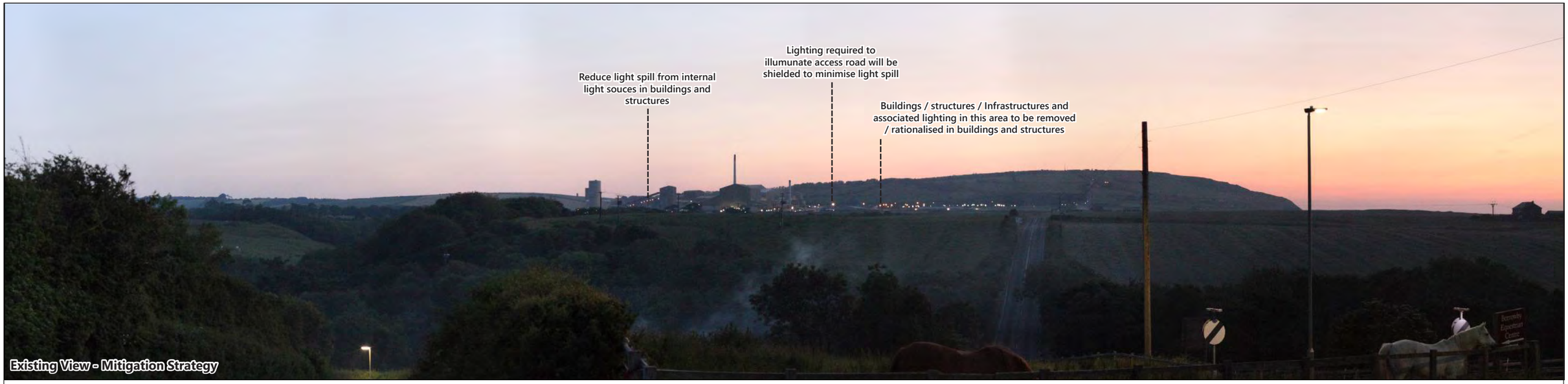

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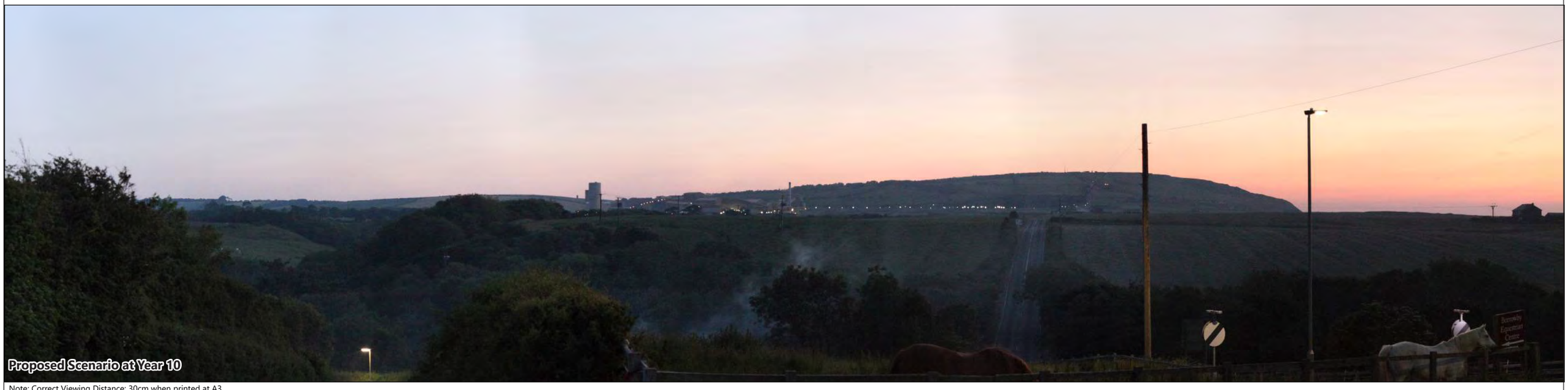

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Boulby Mine New Development

Figure 5b
Viewpoint N3 - Dale House Bank, Staithes
Mitigation Strategy and Year 10
Photomontage

July 2020

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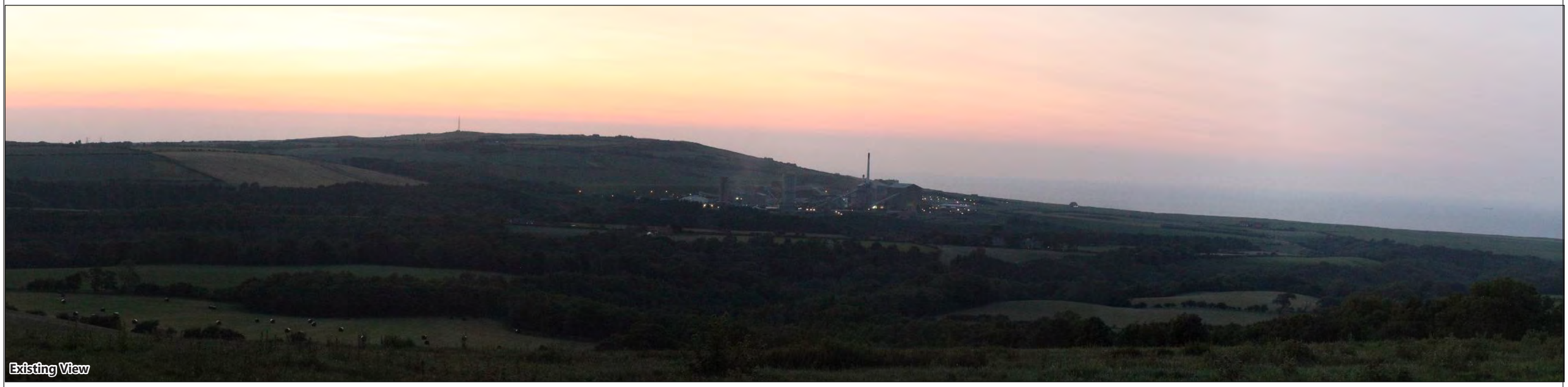

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Cleveland Potash Ltd
Boulby Mine New Development

Figure 5.8a
Viewpoint N4 - Roxby Lane
Existing Operation Mine Baseline Photograph

July 2020

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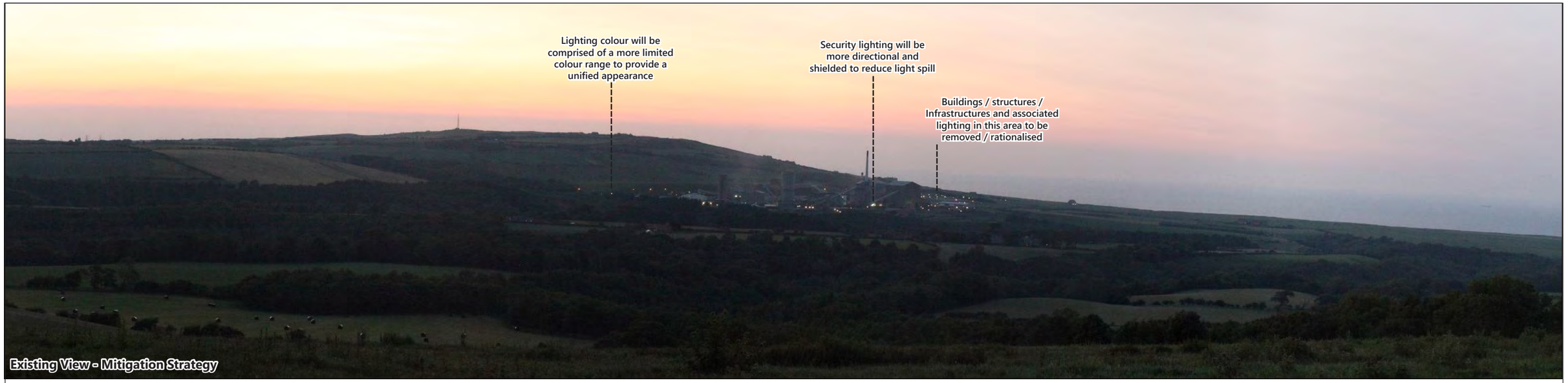

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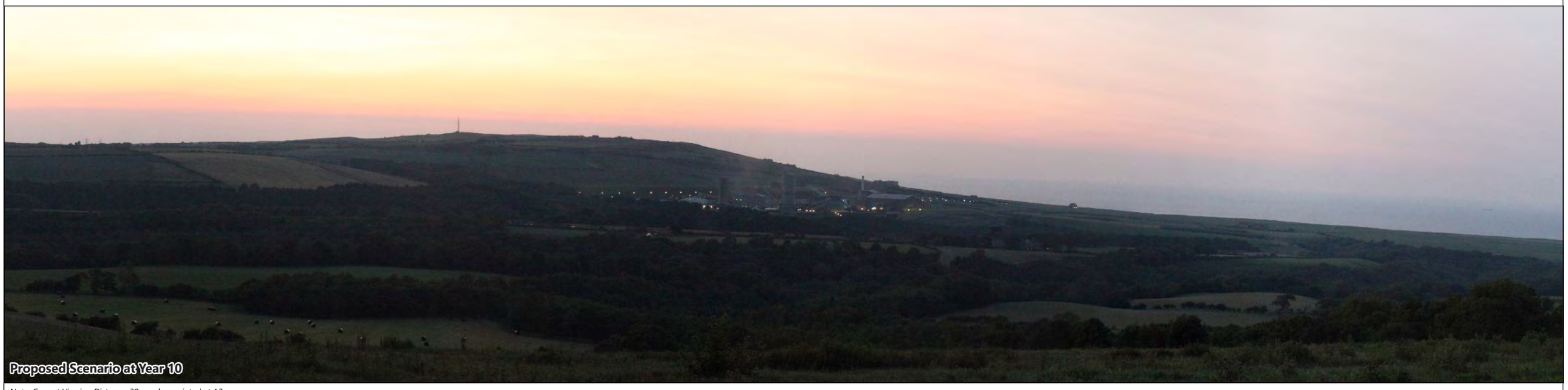

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Photograph Parameters Viewpoint N4:

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Cleveland Potash Ltd
Boulby Mine New Development

Figure 5.8b
Viewpoint N4 - Roxby Lane
Mitigation Strategy and Year 10
Photomontage

July 2020

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Originator: brycc

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Technical note:

Boulby Mine

Landscape and visual implications for a proposed Solar Farm within the Boulby Mine site area and consideration of siting options

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1. Introduction

This technical note considers the landscape and visual implications of siting a solar farm development within the Boulby Mine Site Area. The background to this study is the recent planning application (NYM/2019/0746/MEIA) to extend the working life of the mine and the requirement of North York Moors National Park (NYMNP), Local Plan Policy ENV8 that all new developments over a certain size provide for on-site renewable energy generation to off-set at least 10% of the predicted CO2 emissions the development would generate. Initial feasibility studies have indicated that the preferred renewable energy supply for Boulby Mine would be a solar farm comprising ground mounted solar photo-voltaic panels. Three potential siting options have been identified and following a landscape and visual appraisal recommendations are made with regard to the suitability of these options.

1.1 Scope and limitations of the study

This report has been undertaken by Chartered Landscape Architects employed by Wood PLC on behalf of ICL UK.

The report is intended to identify key landscape and visual issues associated with an options appraisal of land within the Boulby Mine site area for siting a proposed solar PV development. It should be noted that it does not constitute a formal Landscape and Visual Impact Assessment (LVIA) in relation to specific, detailed development proposals. This is because a formal design is not available and it is expected that any planning permission granted would contain a mechanism for considering a formal LVIA and detailed design prior to development of the solar farm. The anticipated development parameters required to introduce a solar farm and associated infrastructure have been described and used to inform the appraisal.

It is intended that the report will show whether a solar farm could be incorporated into the site area, and if so where the best location for the development will be in terms of minimising adverse landscape and visual effects and impacts on the Special qualities of the National Park. The information is considered to be sufficient to provide confidence to the National Park Authority that a solar farm can be accommodated in the landscape, with full details to follow closer to the point of construction.

The three areas under consideration are illustrated in **Figure 1**. To aid understanding of potential visual effects four viewpoints, **Figures 2 - 5**, from the original Boulby Mine LVIA have been used to provide an illustration of the likely extent of visibility for each of the siting options.

The report is structured as follows:

1. Introduction;
2. Planning context;
3. Renewable energy options and feasibility;
4. Site appraisal; and
5. Summary and recommendations.

Supporting information is provided by the following figures:

1. Solar farm siting options;
2. Ings Farm; LVIA Viewpoint 1 – Indicative illustration of solar farm visibility;
3. England Coast Path; LVIA Viewpoint 4 – Indicative illustration of solar farm visibility;
4. Staithes TIC; LVIA Viewpoint 5 – Indicative illustration of solar farm visibility; and
5. Roxby Lane; LVIA Viewpoint 6 – Indicative illustration of solar farm visibility.

2. Planning context

2.1 Policy

Relevant policy relating to the landscape implications of renewable energy has been considered at a local level as follows:

NYMNP Local Plan

The emerging NYMNP Local Plan has recently been found 'sound' by the planning inspectorate, subject to a number of recommended modifications. The NYMNPA has announced it intends to adopt the Local Plan, subject to these modifications, at the end of July 2020. As such, the relevant policies of the local plan are considered below, as they are likely to now be the policies against which the Proposed Development at Boulby Mine is assessed.

Core ENV8 – Renewable Energy

Policy ENV8 relates to the need to increase renewable energy generation to bring about reductions in carbon emissions in the National Park:

The policy seeks for developments over a certain scale to provide on-site renewable energy facilities to generate power that would displace 10% of the predicted CO_2 emissions from the development.

Paragraph 4.63 considers the implications of introducing renewable energy installations within the National Park to meet a 10% displacement figure. The text advises that proposals should not to have an unacceptable visual impact and they will be considered in the same way as other renewable energy proposals. It is also acknowledged that there may be more than one way to meet the policy requirement on any site, and that in

some exceptional circumstances the requirement may not be able to be met and the NYMNPA may vary the requirements in those circumstances.

3. Renewable energy options and feasibility

3.1 Renewable energy options

To meet the requirements of Policy ENV8 an initial appraisal of the following renewable energy typologies have been considered as follows:

- Wind Energy;
  - A wind turbine(s) has the potential to provide the required energy levels but this option has been discounted on the basis of the scale of development required which would introduce unacceptable landscape and visual effects.
- Biomass;
  - There is potential for the existing CHP plant at Boulby Mine to be converted to accept biomass fuels. However, there is no nearby biomass source available and this would result in the requirement to import fuel, which would introduce additional transport impacts and HGV emissions.
- Geothermal heat;
  - The underground workings contain a large source of geothermal heat and in theory, this could be used to provide heat to surface developments. However, there is little need for large volumes of heat within the proposed operations at Boulby Mine over the next 25 years, and there are no large scale heat users in the vicinity of the mine where the heat could be exported to. In addition, there are legal implications on using heat from the mine, as the current lease agreements only cover minerals extraction and not heat.
- Kelp harvesting;
  - Suggestions have been made as to the feasibility of kelp planting in the North Sea, which would trap CO2 within the plants as they grow. To provide a level of kelp planting that would have a substantial impact on the 10% requirement, a large area would be required. There are currently no kelp harvesting operations in the UK that come anywhere near the scale of planting that would be needed here, with commercial kelp farms still in early, pilot phases. Large scale kelp planting also raises questions around the impact on marine designations such as the Runswick Bay Marine Conservation Zone. As such, it is not considered that kelp is feasible option at this point in time.
- Solar PV;
  - Both roof mounted and ground mounted solar PV options have been considered. As a consequence of the proposed building removal and rationalisation programme and the nature of the buildings / structures within the operational mine there would be insufficient roof space to make roof mounted solar schemes feasible. There are however large areas of land within the site area with the potential to accommodate a solar farm utilising ground mounted solar PV panels and these could provide sufficient area to have a substantial impact on the 10% requirement.

3.2 Preferred option

On the basis of the preliminary analysis of renewable energy options, a solar farm utilising ground mounted solar PV panels is considered to be the most viable option to meet the requirements of Policy ENV8.

3.3 Guidance

The following guidance in relation to large scale ground mounted solar PV has been considered during the siting study.

Building Research Establishment (BRE) National Solar Centre

The BRE publication, *Planning guidance for the development of large scale ground mounted solar PV systems,* provides guidance in relation to the policy context, siting, design and technical considerations.

Siting

The document provides general guidance in relation to characteristics of the proposed site area which states;

"Consideration should be given to the existing site contours. If any site levelling works are proposed to facilitate the development of a solar panel array the extent of these levelling works should be discussed at the pre-application stage and detailed within any planning application."

"*Ground Mounted Solar PV projects, over 50kWp, should ideally utilise previously developed land, brownfield land, contaminated land, industrial land or agricultural land preferably of classification 3b, 4, and 5 (avoiding the use of "Best and Most Versatile" cropland where possible)."*

Land selected should aim to avoid affecting the visual aspect of landscapes, maintain the natural beauty and should be predominantly flat, well screened by hedges, tree lines, etc and not cause undue impact to nearby domestic properties or roads.

Ground maintenance

In relation to ground maintenance the guidance provides advice as follows;

"Spraying should be avoided wherever possible and mulching large areas is likely to present technical challenges and may add to the landscape / visual impact of a development proposal. Few of these management techniques are regarded as sustainable, particularly on sites up to 15ha, and there is a desire, both in terms of food production and the rural scene, to continue an agricultural use on the site.

During those times of the year when growth requires managing grazing is to be encouraged wherever practicable. Cattle, horses, pigs and goats are likely to be too 'physical' with the solar arrays but sheep, chickens or geese should be acceptable. In order to facilitate grazing within the solar farm it is advised that solar panels are positioned at least 700mm above ground level and all cabling etc is suitably protected."

Solar reflection

In relation to potential solar reflection the guidance states;

"The potential for solar PV panels, frames and supports to have a combined reflective quality should be assessed. This assessment needs to consider the likely reflective capacity of all of the materials used in the construction of the solar PV farm."

"Glint may be produced as a direct reflection of the sun in the surface of the solar PV panel. It may be the source of the visual issues regarding viewer distraction. Glare is a continuous source of brightness, relative to diffused lighting. This is not a direct reflection of the sun, but rather a reflection of the bright sky around the sun. Glare is significantly less intense than glint."

3.4 Development description

Spatial requirements

Preliminary investigations have shown that a solar farm of approximately 8Ha would be required to provide the necessary energy generation required to offset 10% of the mine's future, predicted CO_2 emissions. Based on the available land and the areas under consideration it is anticipated that the proposed solar farm would occupy a site area of between 7.5 Ha and 16.5Ha allowing an approximate projected output of 11MW to 24MW.

Proposed development and environmental measures

At this stage there are no fixed design proposals for the proposed solar farm. However, to inform the appraisal process a number of assumptions have been made regarding the likely development parameters as follows:

- Site access improvements;
  - Required to facilitate access for construction vehicles/ machinery and deliveries;
- Construction compound;
  - Would be required for storage of materials, plant and machinery together with the provision of office and welfare accommodation and facilities. There would be associated security fencing and lighting.
- Site preparation;
  - Soil stripping and excavation associated with the site access, construction compounds, and cable trenching. This would include the presence of subsoil and topsoil storage mounds.
- Access tracks;
  - Some tracks would be required to facilitate construction and maintenance although it is anticipated that 4WD vehicles or quad bikes could be used to access the majority of the site during the operational period without the need for formal tracks.
  - The number of tracks would be kept to a minimum and surfacing would be an informal sub-base material allowed to colonise naturally or a geotextile based system seeded to create a soft, naturalistic surface.
- Security fencing and lighting;
  - It is anticipated that new security fencing would not be required and that the site boundaries to the development would be defined by existing agricultural fencing and hedgerows.
  - The use of lighting for security purposes would be minimised and utilise passive infra-red technology to minimise light pollution. It is not anticipated that CCTV facilities would be required.

- Solar PV panels;
  - It is anticipated that the solar PV panels would be mounted no higher than 3m from ground level;
  - Mounted on metal frames with support posts to a depth of 1-1.5m to avoid the use of concrete foundations;
  - Orientated towards the south to allow maximum solar gain;
  - Arranged in rows approximately 4-6m apart to avoid overshadowing;
- Inverter station/s and substation;
  - The solar panels will be connected to inverter stations located at appropriate positions across the development site. Each inverter will be enclosed in a cabin measuring approximately 5m in length, 3m in width and 3.5m in height;
  - The inverters will in turn be connected to the National Grid via the existing sub-station facilities located within the Mine Site. Cabling linking the panels will be underground.
  - Buildings utilised to house inverters would be designed to minimise landscape and visual impact and would be appropriate to the local context. Exact materials, finishes and colours for the cabins housing the inverters and the sub-station would be agreed with NYMNP.
- Landscape proposals;
  - Existing trees and hedges would be, as far as possible, retained and incorporated into the overall scheme design and protected during construction;
  - Further hedgerows and areas of woodland planting would be introduced where these measures are compatible with the mine restoration strategy to provide a framework to aid integration with the wider landscape.
  - Surface vegetation (grass/seed mixes) would be specified to maximise biodiversity benefits and continued usage for sheep grazing.

4. Options appraisal

Based on this approximate spatial requirement and the need to minimise adverse landscape and visual impact this feasibility study has considered the most appropriate areas within the site boundary to locate a solar farm. The Boulby Mine site can be considered in terms of three potential areas for locating the solar farm as illustrated in **Figure 1**.

4.1 Area 1 – To the north-west of the site and adjacent to the A174

Site description

Area 1 comprises an area of approximately 16.5Ha to the north west of the operational mine. The site occupies a relatively elevated position above the mine, approximately 115m to 135m AOD, on land which slopes moderately towards the south-east. To the south-west an area of mature woodland, Newton Gill Wood, defines the south western boundary, the northern extent of the area is defined by the A174 with varying levels of screening provided by the intermittent occurrence of hedgerows, scrub and woodland planting. The southern boundary is defined by a minor drainage channel which feeds into Newton Gill to the south-west. Land use is a mix of arable and pastoral agriculture in three irregular field units defined by

remnant, mature, hedgerows. The hedges have not been subject to regular maintenance and as a consequence are gappy and overgrown with some small trees. To the north of the area, near the interface with the A174, there is an immature belt of woodland planting, approximately 30m wide by 450m in length. The woodland is predominantly comprised of deciduous, native species and has been in place for approximately 6-8 years. Between this immature woodland belt and the A174 there is the more sporadic presence of remnant overgrown hedge plants and occasional mature trees.

Footpath 101/3/1 is aligned with Newton Gill towards the west of the area, linking Ings Farm to the north with Mines Wood to the south west of the operational mine.

Solar Potential

The south easterly aspect and relatively open nature of the land indicates high potential for solar development in terms of solar gain. The relatively pronounced aspect of the land may result in the requirement for earthworks and landform change to facilitate the introduction of access tracks and introduction of solar PV panels and associated infrastructure.

Landscape appraisal

Landscape elements

Direct effects on existing landscape elements present within the site area would be introduced as a requirement of the need to introduce site access for construction and maintenance purposes. It is anticipated that the vehicular access would be through the existing track to the gun club facilities off the A174. This track would need to be extended to the west and would require the introduction of a new bridge / culvert to facilitate crossing the existing drainage channel. Access routes would also need to be created through field boundaries although it is anticipated that this could be achieved with minimal loss of existing hedgerow because of the fragmented nature of these features. There would be a small scale loss of surface vegetation and minor earthworks to facilitate introduction of the solar panels. Overall direct effects on the site area would be relatively minor and largely reversible. Introduction of the solar development would not restrict the phased introduction of the wider restoration plan during its operational period. These measures would include strengthening field patterns through the introduction of new hedgerows and the enhancement of existing hedges to field boundaries.

Landscape character

Indirect effects would be experienced quite widely across the northern part of the host, *4a: Coast and Coastal Hinterland* LCA, as a consequence of the characterising influence of the presence of the solar development. The elevated nature of the area with a relatively open aspect to the east and south east would facilitate visibility of the development across large areas of the coastal hinterland and some upland areas to the south east. Generally in these views the development would be perceived as an extension to built development in association with the existing presence of mine buildings and infrastructure. The dark colours of the solar panels would contrast with the lighter neutral tones which predominate in the existing mine development. Introduction of the dark grey panels would also introduce change in relation to the existing site area which is characterised by a mosaic of naturalistic colours and textures.

Landscape designations

North York Moors National Park (NYMNP)

A solar development within this area would have the potential to influence a limited number of the special qualities of the North York Moors National Park (NYMNP) as follows:

- *'Settlements which reflect their agricultural, fishing or mining past; Locally distinctive buildings and building materials';*
  - The modern, industrialised quality of the materials visible in the solar farm and occasional presence of solar reflection would contrast with the traditional range of materials and building styles characteristic of the area.
- *'Strong feeling of remoteness';*
  - There would be a small, incremental erosion of sense of remoteness as a consequence of the presence of a solar farm to the west of the existing mine building in an elevated open situation resulting in the perceived extension of built form into an area previously characterised by soft landscape elements.

North Yorkshire and Cleveland Heritage Coast

The Heritage Coast's Management Plan does not define special qualities but instead defines several key principles of which the first relates to the conservation and enhancement of the coastal landscape; retention of open landscape character; and retention of extensive, uninterrupted views. Boulby Mine is not situated within the Heritage Coast, however, the A174 locally defines the southern boundary of the Heritage Coast and northern boundary of the mine site. Consequently, there is the potential for a solar farm in this area to introduce indirect effects on the Heritage Coast. A solar farm in this area would be visible in some coastal views but overall the development would not be perceived as a prominent of influential aspect within these views and effects on the Heritage Coast as a whole would be minimal.

Visual appraisal

The indicative extent of visibility of Area 1 is illustrated in **Figures 2** to **5**, viewpoints 1,3,5 and 6 respectively from the original Boulby Mine LVIA.

Visual context

This area is relatively elevated and open with the potential for solar development to be perceptible from the coastal hinterland to the north-east and east. Views towards the area are also available from elevated areas to the south-east where the agricultural landscape between the existing mine buildings and the A174 is visible.

Users of the recreational path network

Users of Footpath 101/3/1 would experience close range views, for walkers travelling in both directions, and adverse visual effects for a short section of the route to the south west of the area where the route is aligned with Newton Gill. As the path is routed through Mines Wood the visual influence of the solar development would become less pronounced because of the visual containment provided by the mature woodland. In the recreational route network on Rockcliffe Hill to the north and north-west views to the area would largely be restricted by intervening landform and the larger area of woodland planting to the north. Users of the path network, including NCR 1, the England Coast Path and the Cleveland Way, within the coastal hinterland between Staithes and Boulby would experience views of the solar development. Solar panels would be visible on the elevated land between the mine buildings and properties at Ings Farm. This visibility would be experienced particularly by west bound walkers/cyclists in south westerly views. **Figure 3** provides an indicative illustration of the anticipated extent of visibility from NCR 1/England Coast Path/Cleveland Way.

Local residents

Residents in close proximity to the mine including those in properties at Ings Farm, Boulby and scattered farms and individual properties to the east and south east would principally experience visibility when accessing properties using the local road network. Direct views of the solar development from the curtilage of individual properties would be limited. A small number of residents including those at Ings Farm, Boulby Grange, Red House Farm and Cowbar Farm may experience visibility from the curtilage and particularly first floor windows. In these views visual change would result from the introduction of dark grey solar panels in place of the softer green colours and textures of the existing agricultural landscape. The retention of the existing field pattern and enhancement of the existing hedgerows to field boundaries would maintain green infrastructure and visually separate the mass of solar panels.

Visual effects for residents in local settlements including Staithes would be limited by the intervening presence of the existing mine buildings which would largely screen views of a solar development in this location.

Users of the local road network

The relatively open nature of the land would initially result in visibility from a short section of the A174 adjacent to Ings Farm **(Figure 2).** Visual effects in relation to receptors using this section of the A174 are likely to diminish over time as the maturing woodland belt to the south-east of the route would increasingly filter views towards the solar development. West bound travellers using the A174 would intermittently experience views of solar development on the upper aspects of this area although for much of the route the intervening presence of mine buildings would largely preclude visibility. Road users travelling west on Cowbar Lane towards the A174 would experience visibility of the solar farm on the upper aspects of the site between Ings Farm and mine buildings

4.2 Area 2 – To the northwest adjacent to the rail line

Site description

Area 2 comprises an area of approximately 7.5Ha to the north west of the operational mine and rail head. The site comprises the broad, linear screening landform which runs parallel to the railway and north western extent of the operational mine. Aside from the presence of the screening landform the area is relatively flat ranging in elevation from approximately 100m to 115m AOD. Areas of mature woodland, Newton Gill Wood and Mines Wood, define the south western boundary and the north western extent of the area is defined by the minor drainage channel feeding into Newton Gill. The north western boundary is defined by the land associated with the gun club and the area of mature woodland present to the north of the site adjacent to the A174. Land use within the area is pastoral agriculture in two irregular field units defined by post and wire fencing. There is a small surface reservoir to the south west with an associated are of mature vegetation and which also links with a short section of mature hedge. Footpath 101/3/1 is aligned with Newton Gill and is routed through Newton Gill Wood and Mines Wood to the south west of the area.

Solar Potential

The relatively flat, open nature of the area indicates that there is potential or the site to fulfil the solar gain requirements for a viable solar farm. The main constraint is the presence of the screening landform with a north westly aspect which may preclude this part of the area from being used for solar development.

Landscape appraisal

Landscape elements

The site area comprises a relatively simple mix of landscape elements which would largely remain intact and unchanged as a consequence of introducing the solar development. It is anticipated that access for construction and maintenance vehicles would be via the gun club access track. A short connecting spur and track network would also be required to facilitate access through the development and this would result in the loss of some surface vegetation and a requirement for minor earthworks.

It is anticipated that introduction of the solar development would not prevent the phased implementation of the restoration scheme. Elements of the phased restoration would be introduced simultaneously including a strengthened field pattern through the provision of new native hedgerows. This aspect would have the further benefit of providing a strong landscape framework for the proposed solar development.

Landscape character

The potential for a solar development situated within this area to influence landscape character beyond the site area and immediate context would be limited by the restricted visibility across the wider *4a: Coast and Coastal Hinterland* LCA. Visibility of the development would be restricted by the presence of the existing mine buildings and infrastructure particularly as perceived from the coastal hinterland to the east and south east. The presence of mature woodland to the southern and northern extent of the site area would further restrict visibility and the potential for a solar scheme in this area to be a strong characterising presence.

Landscape designations

NYMNP

A solar development within this area would have the potential to influence a limited number of the special qualities of the North York Moors National Park (NYMNP) as follows:

- *'Settlements which reflect their agricultural, fishing or mining past; Locally distinctive buildings and building materials';*
  - The modern, industrialised quality of the materials visible in the solar farm and occasional presence of solar reflection would contrast with the traditional range of materials and building styles characteristic of the area.
- *'Strong feeling of remoteness';*
  - Small, incremental erosion of feelings of remoteness as a consequence of the presence of a solar farm to the south of the existing mine building resulting in the perceived extension of built form into an area previously characterised by soft landscape elements.

Heritage Coast

The very limited intervisibility and restricted presence of a solar development within this area in views from the coast would limit the potential to introduce adverse effects on the Heritage Coast.

Visual appraisal

The indicative extent of visibility of Area 2 is illustrated in **Figures 2** to **5**, viewpoints 1,3,5 and 6 respectively from the original Boulby Mine LVIA.

Users of the local path network

Walkers using footpath 101/3/1 would experience close range, open views of the proposed solar development for a short section of the route between he A174 and Newtown Gill Wood resulting in a high magnitude of visual change. Generally the high level of visual containment provided by the presence of the existing mine buildings would result in very limited change as perceived by users of the path network in the coastal hinterland to the north-east and east and the wider agricultural landscape to the south-east and south. Views of the proposed solar development would occasionally be available from sections of the recreational path network to the south, around Roxby and Borrowby, where a combination of the elevated viewing position and orientation of view in relation to the existing retained buildings would allow partial visibility. **Figure 5**, LVIA Viewpoint 6, provide an indicative illustration of the extent of visibility from Roxby Lane.

Local residents

Visual change may be experienced by residents from a very limited number of properties. This would include dwellings at Ings Farm where relatively open views of the site area are available particularly from first floor windows. The solar farm would be visible to the west of the existing mine buildings and linear screening bund although views would be partially filtered by existing hedgerows in the intervening agricultural area. Phased implementation of the restoration scheme would include the enhancement of these hedges, introduction of additional hedgerows which together with the progressive maturation of the linear woodland belt to the east of the A174 would increasingly filter views of solar development. Elsewhere visibility of residents at Boulby to the north

Users of the local road network

Road users travelling along a short section of the A174 to the north and east of Ings Farm Cottages experience open views to the east from an elevated situation. Visibility of the proposed solar farm would be available although views would generally be at an oblique angle to the direction of travel and would be perceived in relation to a backdrop of the linear screening mound and

4.3 Area 3 – Located to the northeast adjacent to the A174

Site description

Area 3 comprises an area of approximately 14.5Ha to the north east of the operational mine. The site is situated on a relatively open plateau adjacent to the A174 at an elevation which ranges from approximately 60m to 77m AOD and which slopes gently towards the south-east. The northern boundary is defined by a timber post fence at the interface with the A174 corridor to the east a mix of stockproof fence and varied range of woodland and scrub demarcates the extent of the area. A mix of tree planting and stockproof fence defines the western extents and the southern boundary is largely open and undefined. Mature woodland, Rabbit Hill Plantation and Low Ridge Lane Wood, are situated approximately 200m to the south east within the Easington Beck valley The area comprises a mix of grassland used for grazing and areas of woodland and scrub at varying states of maturity including belts of single species willow planted to provide screening of lower level mine buildings and infrastructure.

Footpath 101/4/1 links the A174 to the north with Rabbit Hill Plantation and Easington Gill to the south and is routed through the mine site along the eastern boundary of the option 3 area.

Solar Potential

The easterly/south-easterly aspect and relatively open nature of the site indicates potential to accommodate a feasible solar farm. Some existing areas of trees/scrub would need to be removed or rationalised to facilitate development and maximise solar gain.

Visual context

This area is visually open with potential for solar development to be perceptible from the adjacent A174 corridor and more widely from the coastal hinterland between Boulby and Staithes. Within the coastal hinterland further to the east, beyond Staithes, the site is unlikely to be widely perceived because of the relatively flat, low lying situation and presence of mature vegetation and occasionally built development within the intervening landscape. Potential for a solar development to be viewed in relation to wider views of the coastal landscape from elevated land to the west (areas of Rockcliffe Hill) and to the south and south east (areas of Roxby and Borrowby Moors).

Landscape appraisal

Landscape elements

The site comprises a relatively straightforward mix of grassed fields used for grazing and a fragmented mix of woodland and scrub. It is likely that introduction of a solar farm would result in the loss of some immature trees and scrub as the site is cleared and rationalised to provide the continuous expanse of open land required to site the development. Otherwise it is anticipated that vehicular access would be provided via a short connecting spur off the main mine access road resulting in the loss of a small amount of grass and short sections of fencing. This spur would link into a track network providing access to the solar farm which would also require the removal a small areas of grass and woodland/scrub.

As part of the phased restoration scheme and the proposed building removal and rationalisation plan the area between the main operational mine and the A174 is programmed to undergo considerable change within the next 10 years. A number of buildings, structures and associated infrastructure would be removed allowing the progressive implementation of restoration proposals which would include introduction of further agricultural field units, hedgerows, meadow areas and woodland planting. Introduction of a solar farm in this area would necessitate alteration, delay of the restoration programme and extent to which the proposed planting would begin to reach maturity and provide effective mitigation.

Landscape character

In a scenario where a solar farm was developed within this area the open nature of the site and situation beyond the visual containment provided by the large scale mine buildings or the backdrop of Rockcliffe Hill would result in the potential for the development to be a characterising influence on the A174 corridor and coastal hinterland. In views from elevated areas to the south and south east the development would be perceived as a lateral expansion of built development to the north and east of the existing mine buildings. This expansion would be perceived in relation to views of the North Sea coastline and would introduce localised adverse effects on the northern area of the host, 4a: Coast and Coastal LCA a key characteristic of which is that *"Elevated areas allow long distance views across the area and out to sea"*.

Landscape designations

NYMNP

A solar development within this area would have the potential to influence a limited number of the special qualities of the North York Moors National Park (NYMNP) as follows:

- *'Majestic coastal cliffs and sheltered harbours';*
  - The solar farm would occasionally be perceived in association with views of the dramatic coastal landforms particularly in views from elevated areas to the west and south/ south-east potentially resulting in minor adverse effects in relation to this quality.
- *'Settlements which reflect their agricultural, fishing or mining past; Locally distinctive buildings and building materials';*
  - The modern, industrialised quality of the materials visible in the solar farm would contrast with the traditional range of materials and building styles characteristic of the area.
- *'Strong feeling of remoteness';*
  - Small, incremental erosion of feelings of remoteness as a consequence of the presence of a solar farm to the south of the existing mine building resulting in the perceived extension of built form into an area previously characterised by soft landscape elements.

Heritage Coast

The proximity of the site to the Heritage Coast and open nature of the area would result in the potential for the presence of a solar farm to introduce localised effects in relation to the influence of built development in views from the coastal landscape.

Visual appraisal

Users of the local path network

Walkers travelling both ways on footpath 101/4/1 would experience fundamental change as a consequence of direct, close range views of the proposed solar farm as the route passes through the mine site area. Users of the England Coast Path / Cleveland Way would frequently experience views of the solar farm as the path is routed between Boulby and Staithes. In these views the dark grey solar panels would be perceived as a broad low expanse of built development viewed in relation to the larger scale, lighter coloured and more visually prominent assemblage of existing mine buildings. Elsewhere the perceived change would be less influential on the visual experience for people using the recreational path network.

Local residents

Residents in a limited number of properties may experience relatively short - range direct views of the proposed solar farm resulting in adverse visual effects. This would include Red House Farm and Boulby Grange where residents would experience a change in visual experience as a result of the introduction of solar panels / associated infrastructure in an area which currently comprises soft, naturalistic landscape elements. More widely, it is not anticipated that the proposed solar farm would not be a strong visual presence for residents within local settlements. Residents in Staithes would experience visibility of a relatively small extent of development in relation to existing views of the larger scale mine buildings. Occasional visibility of solar reflection is expected to be the main visual influence as perceived by residents in Staithes.

Users of the local road network

People travelling both ways on the A174 would experience close range views of the proposed solar farm in close range views for a short section (up to 1km) of the route between Boulby Bank and Staithes resulting in high levels of visual change and adverse visual effects. In longer range views from the route the solar farm would be less prominent and would be perceived as a relatively minor expansion of built development in relation to the existing presence of the mine. There would be occasional visibility of the development from the minor road network to the east of the A174 between Boulby and Cowbar, particularly for users of Cowbar

Lane travelling towards the A174. The relatively low height of the solar farm and the flat landscape would result in a relatively small extent of visible development in relation to the existing taller, large scale mine buildings as perceived in most of these views.

5. Summary and conclusion

5.1 Summary of potential landscape and visual effects

Table 5.1 provides a summary of the key landscape and visual implications for each of the three areas under consideration for siting solar development within the general Boulby Mine site area.

Table 5.1 Summary of potential landscape and visual effects

Landscape and visual effects	**Potential area for solar farm development**		
	Area 1	**Area 2**	**Area 3**
Landscape effects			
Site area - elements	Limited direct effects resulting from temporary loss of some surface vegetation, minor earthworks and drainage channel crossing. Minimal requirement to remove existing mature trees and hedges. Simultaneous introduction of the Boulby Mine phased restoration scheme would provide an improved landscape framework and strengthen existing field boundaries.	Limited direct effects resulting from temporary loss of some surface vegetation and minor earthworks. Minimal requirement to remove existing mature trees and hedges. Simultaneous introduction of the Boulby Mine phased restoration scheme would provide an improved landscape framework and strengthen existing field boundaries.	Some loss of scrub/semi-mature woodland, temporary loss of some surface vegetation and minor earthworks.
Landscape character	The presence of the solar farm on the upper aspects of this area would have a minor characterising influence on a small extent of the host, *4a: Coast and Coastal Hinterland* LCA between Staithes and Boulby.	Restricted intervisibility with the host and adjoining LCA's would limit the characterising influence of a solar development in this area.	The presence of the solar farm in the open landscape beyond the visual containment provided by existing mine buildings would introduce a characterising influence on a restricted area of the host, *4a: Coast and Coastal Hinterland* LCA between Staithes and Boulby. A solar farm in this area would also be present in characteristic views of the coastal landscape from some elevated area of the adjoining character area, *1c: Northern Moors* LCA.
NYMNP Special Qualities	Effects would be experienced within a localised area of the National Park in relation to two of the Special Qualities including: • *'Settlements which reflect their agricultural, fishing*	A relative lack of intervisibility in relation to a solar development in this area and the wider National Park limits the potential to influence the NYMNP Special Qualities.	Localised effects would be experienced in relation to three of the National Park Special Qualities including: • *'Majestic coastal cliffs and sheltered harbours';*

Landscape and visual effects	Potential area for solar farm development		
	Area 1	**Area 2**	**Area 3**
	or mining past; Locally distinctive buildings and building materials'; • *'Strong feeling of remoteness'.*		• *'Settlements which reflect their agricultural, fishing or mining past; Locally distinctive buildings and building materials';* • *'Strong feeling of remoteness'.*
RCHC Key Principles	Very limited effects in relation to the presence of the solar farm in some coastal views.	A solar development in this area would not generally be perceived in coastal views.	The presence of a solar farm adjacent to the southern boundary of the Heritage Coast would introduce localised effects in relation to the influence of built development in views of the coastal landscape.
Visual effects			
Recreational users	Direct, close range views of the solar development would be available for walkers using a short section of footpath 101/3/1 which would result in a high level of visual change. Visual change experienced by users of NCR1, the Cleveland Way and the England Coast Path would be minimal.	Direct, close range views of the solar development would be available for walkers using a short section of footpath 101/3/1 which would result in a high level of visual change. Visual change would not generally be perceived by users of NCR1, the Cleveland Way and the England Coast Path.	Direct close-range views of the solar development would be available for walkers using footpath 101/4/1 which would result in a high level of visual change. A solar farm in this location would be widely visible from the recreational route network in the coastal area between Boulby and Staithes.
Residents	Generally limited visual change experienced by residents. Properties at Ings Farm Cottages overlook the potential solar area and residents/visitors would experience partially filtered, close range views in the context of the existing presence of the mine buildings.	Generally limited visual change experienced by residents. Partially filtered mid-range views would be experienced by residents at Ings Farm Cottages.	Some close to mid-range views for a limited number of properties including Red House Farm and Boulby Grange.
Road users	Short lived, transient, close - range views would be experienced by east/north bound travellers for a short section of the A174 near Ings Farm. Otherwise a solar development in this location would not be a strong visual influence on users of the minor road network	Short lived, transient, mid-range views would be experienced by east/north bound travellers for a short section of the A174 near Ings Farm. Otherwise a solar development in this location would not be a strong visual influence on users of the minor road network	Open, close range views would available for users of the A174 introducing high levels of visual change for a short section of the route. Users of Cowbar Lane would also experience close range views near junction with A174.
Implication for implementation of phased restoration scheme	A solar development in this area could be designed to integrate with the restoration scheme.	A solar development in this area could be designed to integrate with the restoration scheme.	Some aspects of the phased restoration scheme, including the introduction of large areas of woodland planting adjacent to the A174 would not be

Landscape and visual effects	Potential area for solar farm development		
	Area 1	Area 2	Area 3
			compatible with a solar development in this area.

5.2 Conclusion

This appraisal has considered the background to the proposal to introduce a solar PV development within the Boulby Mine site area. Three options have been considered and a clear preference has emerged in terms of the area which would minimise landscape and visual effects. Area 2 is considered to provide the most suitable location for a solar farm on the basis of the greater level of visual containment provided in relation to sites 1 and 3. This containment is provided by the presence of the existing mine buildings to the east, a mature woodland plantation to the north, an area of mature woodland to the south and the backdrop of Rockcliffe to the west.

Issued by

David Stokoe

Approved by

Neil Marlborough

Key

- Site boundary
- Screening landform
- Area 1
- Area 2
- Area 3

0 m 400 m

Scale 1:7500 @ A3

Boulby Mine New Development

Figure 1
Potential areas for solar farm development

June 2020

wood.

Originator: DAVID STOKOE
40513-WOOD-XX-XX-DR-L-0001_S0_P01.1 Figure 1.indd

Note: Correct Viewing Distance: 30cm when printed at A3.

Area 1

Area 2

Area 3

Photograph Parameters Viewpoint 1:

Horizontal field of view	75° (cylindrical projection)	Camera:	Canon EOS 5D Mk II
Principal distance:	300mm	Lens:	50mm
Paper size:	420mm x 297mm (A3)	Camera height:	1.6m AGL
Correct printed image size:	393 x 95mm	Date and time:	05/11/2017 16:13

Boulby Mine New Development

Figure 2
Ings Farm; LVIA Viewpoint 1 – Indicative illustration of solar farm visibility

June 2020

wood.

W:\GWM\DATA\PROJECT\40513 Boulby Mine New Development\D040 Design\LVIA\Post submission\Drawings\Boulby Mine Montage Work\VP1\40513-Gos49 Viewpoint 1.indd Originator: brycc

Note: Correct Viewing Distance: 30cm when printed at A3.

Area 1

Area 2

Area 3

Photograph Parameters Viewpoint 4:

Horizontal field of view	75º (cylindrical projection)	Camera:	Canon EOS 5D Mk II
Principal distance:	300mm	Lens:	50mm
Paper size:	420mm x 297mm (A3)	Camera height:	1.6m AGL
Correct printed image size:	393 x 95mm	Date and time:	05/11/2017 11:21

Boulby Mine New Development

Figure 3
England Coast Path; LVIA Viewpoint 4 – Indicative illustration of solar farm visibility

June 2020

wood.

W:\GWM\DATA\PROJECT\40513 Boulby Mine New Development\D040 Design\LVIA\Post submission\Drawings\Boulby Mine Montage Work\VP4 England Coast Path\40513-Gos50 Viewpoint 4.indd Originator: brycc

Note: Correct Viewing Distance: 30cm when printed at A3.

Area 1

Area 2

Area 3

Photograph Parameters Viewpoint 5:

Horizontal field of view	75° (cylindrical projection)	Camera:	Canon EOS 5D Mk II
Principal distance:	300mm	Lens:	50mm
Paper size:	420mm x 297mm (A3)	Camera height:	1.6m AGL
Correct printed image size:	393 x 95mm	Date and time:	05/11/2017 11:53

Boulby Mine New Development

Figure 4
Staithes; LVIA Viewpoint 5 – Indicative illustration of solar farm visibility

June 2020

wood.

Note: Correct Viewing Distance: 30cm when printed at A3.

Area 1

Area 2

Area 3

Photograph Parameters Viewpoint 6:

Horizontal field of view	75° (cylindrical projection)	Camera:	Canon EOS 5D Mk II
Principal distance:	300mm	Lens:	50mm
Paper size:	420mm x 297mm (A3)	Camera height:	1.6m AGL
Correct printed image size:	393 x 95mm	Date and time:	05/11/2017 14:13

Boulby Mine New Development

Figure 5
Roxby Lane; LVIA Viewpoint 6 – Indicative illustration of solar farm visibility

June 2020

wood.

W:\GWM\DATA\PROJECT\40513 Boulby Mine New Development\D040 Design\LVIA\Post submission\Drawings\Boulby Mine Montage Work\VP6 Roxby Lane\40513-Gos52 Viewpoint 6.indd Originator: brycc

wood.

Technical note:

Boulby Mine Solar farm: summary of environment effects, other than landscape and visual

1. Solar farm location

In response to the requirements of Policy ENV8 of the Local Plan, and following discussions with NYMNPA, ICL Boulby are proposing a solar farm scheme on land to the west of the existing Mine Site. A total of 7.5ha of land is available within an area located on the lower slopes of the bank which rises up from the rail line serving the Mine Site, towards the A174 near Ings Farm. The proposed location is shown within the technical note on the 'Landscape and visual implications for a proposed Solar Farm within the Boulby Mine site area and consideration of siting options'. This note also shows how, from a landscape and visual impact perspective, the location is the most appropriate site within ICL Boulby's landholdings for a solar scheme of sufficient size to make a real contribution to the Policy ENV8 requirements.

It is considered that the landscape and visual impact effects of the solar farm would be the key consideration in terms of the environmental effects of this proposal, but a relevant consideration of other matters is presented below.

2. Noise and vibration

The proposed solar farm would only create noise through the construction activities which would be temporary in nature and located approximately 300m away from the nearest residential property (Boulby Grange), with Ings Farm (over 400m) next closest. The main noise activity would probably arise from the creation of the foundations for the panels, either excavation of foundation pits and filling with material to hold the panel structures in place, or piling of foundations directly into the ground. Intervening tree cover, topography and noise from traffic from the A174 are likely to abate any noise from the construction activities at these receptors to a level which would not be significant.

Piled foundations for solar panels would be relatively shallow (compared to usual piling for buildings or plant) and would not give rise to any adverse vibration effects.

Once operational, it is not expected there would be any discernible effects from this subject arising.

3. Air Quality and Dust

The construction activities may give rise to low levels of emissions to air from the plant and machinery used on site and from dust if excavated foundations are used. However, standard construction management techniques, including using modern, efficient equipment, dust suppression during excavations and cleaning of vehicles if needed before they leave the site will all minimise arisings to an acceptable level.

Once operational, it is not expected there would be any discernible effects from this subject arising.

4. Traffic and Transport

Traffic generated by the proposed solar farm would mainly occur during the construction phase, from the construction workers coming to site, plant and machinery deliveries and deliveries of the solar panel equipment. Whilst there is a direct access point to the proposed location via the old ironstone mine entrance opposite Boulby Bank, this would be unsuitable for larger, slow moving vehicles. Access is therefore likely to be more appropriate through the main Mine Site entrance and crossing the rail line at an existing crossing point to the south west corner of the Mine Site.

It is proposed that any construction activities would be timed to avoid deconstruction works on the mine Site to avoid any cumulative traffic issues and therefore the traffic arisings are likely to be accommodated within the existing peaks of mine deliveries and not lead to any unacceptable effects.

5. Ecology and Ornithology

The existing ecological work in the ES shows that the proposed location is a mixture of improved and semi-improved grassland which is predominantly used for sheep or cattle grazing. Features which potentially have more ecological interest, such as a ditch feeding into Newton's Gill which runs along the north-western boundary, trees and a pond to the south west and a mixed woodland area to the north, have all been avoided by the proposed footprint. It is expected that standard construction techniques will be able to avoid any impact on these features.

The pond to the southwest tested positive for Great Crested Newt DNA in 2017, indicating that this species uses this pond. Measures would need to be taken during construction to prevent newts from entering the construction area, but no impacts would take place on the pond itself. Once operational the solar farm would have no impact on newts using the grassland under the panels for foraging or commuting.

Bats have been recorded in and around the woodland areas to the north and south of the proposed location, and are likely to use the line of the ditch to the northwest boundary as a foraging/commuting route between the two areas. These features will not be disturbed by the proposed solar farm.

No other features or species of interest were identified int his area, and it is important to note that once operational the existing habitats in these fields will be able to continue and relevant species will also be able to use the land under and around the panels.

6. Historic Environment

No features of heritage interest are located within the proposed location, with the closest features on record being the Three Crosses Well listed building located at the top of the bank to the west around 400m away. Some of the land in question will have been previously disturbed by the original Mine Site construction works and therefore the likelihood of encountering any unknown archaeological remains is considered to be low.

Due to the limited visual impact of the proposed location, and the impact of the main Mine Site, it is unlikely that the solar farm would have any substantial, indirect adverse impacts on the settings of other historic features in the surrounding area.

7. Tourism and Recreation

The closest tourism or recreational receptors to the proposed solar farm location are tourist accommodation cottages at Boulby and National Cycle Route 1 as it runs along Boulby Bank. In addition, some views of the scheme might be available from the Cleveland Way and England Coast path in the area between Cowbar and Boulby. Any views that are available from any of these receptors are however likely to be glimpsed views due to screening from landforms and tree cover and would not be expected to create any substantial effect, especially when viewed in the context of the wider Mine Site.

8. Other subjects in EIA

No effects are anticipated from the solar farm on geology and subsidence, climate or health and safety matters.

9. Hydrology and hydrogeology

This subject was scoped out of the EIA so is considered here in relation to the solar farm scheme.

No foundations work would be deep into the ground, from either excavated or piled foundations. The ecological work in the ES shows that the proposed location contains no groundwater dependent ecosystems. No impacts on either deep or shallow hydrogeological receptors would arise.

No surface water features would be directly affected by the construction works and standard construction techniques would be employed to control water run-off from the construction works and avoid any pollution incidents. The proposed location is not within any identified flood risk areas and there would be limited, if any, areas of hardstanding required which could lead to changes in the surface water run off regime once operational, and increase the risk of flooding elsewhere.

10. Conclusions

The separate technical note on landscape and visual matters, and the information set out above, indicates that the proposed location is suitable for a solar farm of the scale identified.

As the proposed location is within the red-line boundary of the existing application there are considered to be two options for confirming the proposals. It could either be approved within the current application in an ‘outline’ form, with full details ‘reserved’ under condition to be submitted and agreed prior to development of the solar scheme commencing. This condition can be subject to a time frame which would ensure that the solar scheme is developed at an early stage of the development to ensure the benefits from it are realised.

Alternatively, a separate planning permission would be needed for the solar farm, with a condition imposed on the main permission to ensure the solar proposals are brought forward. Care would have to be taken with the wording of any such condition to make sure the phrasing and timings included are reasonable and enforceable.

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From: Marlborough, Neil
Sent: 09 October 2020 15:10
To: Mark Hill
Cc: Rob Smith; Chris France; David Mcluckie; Donna Bennison
Subject: RE: HRA additional information

Please find attached the response to the review of the HRA information which had been undertaken by Wilkinson Associates.

Hopefully this suffices for the purposes of the HRA, and allows Natural England's previously stated opinion that they there would be no Likely Significant effects, and therefore no need for a full Appropriate Assessment, to be confirmed by the NPA.

Regards

Neil

Neil Marlborough
Technical Director, Planning and EIA
Wood Environmental & Infrastructure Solutions UK

wood.

Technical note:
Boulby Mine Habitats Regulations Assessment Responses to a review by Wilkinson Associates

Wood produced a report to inform Habitats Regulations Assessment (HRA) Screening[1] for the proposed Boulby Mine development on behalf of Cleveland Potash Ltd, which was submitted to the competent authority, North York Moors National Park Authority (NYMNPA), with the project Environmental Statement (ES). Natural England responded to this on 18 December 2019[2] requesting additional road traffic information. This information was submitted by Wood on 09 March 2020[3] and Natural England responded on 07 April 2020[4] to confirm that the package of information provided was now sufficient to inform the HRA and that it could be concluded that there were no Likely Significant Effects on European sites. In addition, the project air quality assessment was updated and submitted in May 2020[5] which confirms all of the findings in the originally submitted air quality assessment.

NYMNPA commissioned Savills to review the HRA Screening information provided for the application, and Savills instructed Wilkinson Associates to undertake this review[6]. It is understood that the review has not taken into account the consultation responses from Natural England or the additional traffic information and updated air quality assessment which have been submitted (and referenced above).

Table 1.1 below provides responses to the key points raised in Section 5 of the Wilkinson Associates review 'Screening for Likely Significant Effects'.

[1] Wood Environment and Infrastructure Solutions UK Ltd. October 2019. Appendix 9N Habitats Regulations Assessment Screening. Doc Ref. 40513-WOOD-XX-XX-RP-O-001_S0_1. Report for Cleveland Potash Ltd.
[2] Letter from Liam O'Reilly (Natural England) to Mark Hill (NYMNPA) dated 18 December 2019 (NE Ref. 300717).

[3] Letter from Neil Marlborough (Wood) to Liam O'Reilly (NE) dated 09 March 2020 (Ref. 40513-Wood-XX-XX-CO-OE-0001_A_1).
[4] Email from Liam O'Reilly (NE) to Mark Hill (NYMNPA) dated 07 April 2020.
[5] Wood E&IS UK Ltd, May 2020. Technical Topic Chapter Air Quality and Dust. Doc Ref. 40513-WOOD-XX-XX-RP-O-001_S0_1.
[6] Wilkinson Associates Environmental Consultants Ltd, 27 July 2020. Boulby Mine, North York Moors National Park: review of Habitats Regulations Assessment Screening Report. Report prepared for Savills, on behalf of North York Moors National Park Authority.

Table 1.1 Responses to points raised in Section 5 of the Wilkinson Associates review report

Reference number	Review paragraph reference	Review comment	Response, clarification or additional information
Likely significant effects on North York Moors SAC			
A1	5.2.2	"It is not clear how relevant the Fylingdales wind rose diagram is to air movement patterns at Boulby Mine, given that it is some 24 km away from the mine and further from the coast. However, even if it does accurately represent the prevailing wind direction there will still be periods when northerly (NW, N, NE) winds occur and these would be likely to carry emissions from Boulby Mine towards the SAC".	The Air Quality and Dust chapter of the Environmental Statement was updated in May 2020. Figure 7.3 of this report presents a wind rose diagram from Loftus, located approximately 2.5km to the north-west of Boulby Mine, which is closer and more relevant than the Fylingdales wind rose. This shows that the predominant wind direction is south-westerly, which concurs with the information provided from Fylingdales. The Natural England study into atmospheric nitrogen at the SAC[7] also relies on the wind rose data from RAF Fylingdales (see Figure 1 of the report). The information on wind direction which was taken into account within the report to inform HRA screening (Wood 2019) is therefore reliable.
A2	5.2.2	"The fact that other air pollution sources are likely to make up a higher proportion of nitrogen deposition on the SAC as a whole (which covers an area of 44,000 ha) does not in itself rule out the likelihood of a significant effect arising from Boulby Mine emissions on the areas of the SAC within the identified 10 km zone of influence. As mentioned in the introduction to this section, the cumulative effects of the proposal combined with other sources of emissions is relevant to the assessment, and it should not be automatically concluded that a minor or small-scale effect is insignificant".	Section 7.8 of the updated air quality report (May 2020) states the following in relation to cumulative effects: - *"A review of the area surrounding Boulby Mine indicates that it is unlikely there will be cumulative impact to dust or air quality as there have been no similar industries identified in the vicinity.* - *With regard to cumulative impact to air quality from transport emissions, Chapter 8 Transport states that it is likely vehicles from the site will have dispersed into the wider network past the junctions with the A173 and A171, therefore cumulative impacts would be most likely on the A174. However, there are no committed proposed developments within the primary A174 route that would need to be considered".* It is noted from NE guidance (Steps 4b and 4c within the report) that *"it is only the appreciable effects of those other plans and projects that are not themselves significant alone which are added into an in-combination assessment with the subject proposal"*[8]. To identify live project applications within a 15km radius search area (those with potential

[7] Natural England, October 2015. Improvement Programme for England's Natura 2000 Sites (IPENS) – Planning for the Future IPENS049. Case Study F: Atmospheric nitrogen profile for North York Moors SAC.
[8] Natural England, June 2018. Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations.

Reference number	Review paragraph reference	Review comment	Response, clarification or additional information
			effects not deemed to be LSEs), a search was undertaken of the National Infrastructure Planning[9] and relevant local planning portals[10],[11]. Outside of the search area, approximately 19km to the west, is the Tees Combined Cycle Power Plant (CCPP). a gas fired combined cycle gas turbine power station with a maximum generating capacity of up to 1,700 MWe. This was granted development consent in April 2019. The secretary of State's HRA report[12] states that due to uncertainty around whether embedded measures to minimise pollution impacts should be regarded as mitigation, an appropriate assessment was undertaken. Given that these effects have been taken to be significant then they should not be considered in combination with the insignificant effects of the proposed development. It is also outside of the search area and hence not included within the in-combination assessment. The HRA report does however make a number of conclusions which are relevant to the proposed development, including an acceptance of a qualitative rather than quantitative in-combination assessment (see Paragraphs 7.6, 7.7 and 7.8). The Tees CCPP in-combination assessment considered only one additional development (see Paragraph 7.3), the MGT biomass facility ('Tees Renewable Energy Plant'), however that is located further away from Boulby Mine than the Tees CCPP and is therefore also excluded from the Boulby Mine assessment. The Woodsmith Polyhalite mine project has a mine head site near Sneaton, over 15km to the south-east of Boulby Mine and a processing facility at Wilton over 15km to the west of Boulby Mine. Work on the mine head site commenced in May 2017. As the project is outside of the search area it has been excluded from the in-combination assessment. No other relevant developments were identified within the search area, partly as the closest industrial area (at Teesside) is located beyond the 15km search area (noting that it is also downwind of the SAC). Natural England 'Case Study F: Atmospheric nitrogen profile for North York Moors SAC' (NE 2015) identifies the main sources of nitrogen pollution at the SAC. This states that

[9] https://infrastructure.planninginspectorate.gov.uk/ Accessed on 02 October 2020.
[10] https://www.redcar-cleveland.gov.uk/resident/planning-and-building/Pages/planning-and-building.aspx Accessed on 02 October 2020.
[11] https://www.northyorks.gov.uk/planning-and-development Accessed on 02 October 2020.
[12] Department for Business, Energy and Industrial Strategy, April 2019. Tees Combined Cycle Power Plant. Regulation 63 of the Conservation of Habitats and Species Regulations 2017.

Reference number	Review paragraph reference	Review comment	Response, clarification or additional information
			agricultural activities are the largest source of nitrogen deposition contributing ~46-52% of the total. The contribution from road transport sources is estimated to be approximately 6%, despite the site being intersected by A roads. Sources from outside of England are thought to contribute around 22% of the total. Non-agricultural (point) sources are estimated to contribute 15-26% of total nitrogen deposition. Of these, the report identifies notable sources to be RAF Fylingdales which is located upwind of the site and two very large industrial sources in Middlesbrough. The report notes however that the latter two sources are located downwind of the SAC so may not necessarily contribute to N deposition at the site. No other large non-agricultural point sources are identified in the report. The HRA for the Tees CCPP took account of information provided to support the in-combination assessment which outlined that the long term trend for UK air quality is one of improvement, including in oxides of nitrogen and transboundary pollution. Linked to that, the Industrial Emissions Directive promotes the adoption of Best Available Techniques in industrial facilities to promote continued reductions in emissions. It was therefore accepted that the baseline scenario was not static and instead was following a trend of reducing emissions including nitrogen deposition (see Paragraphs 7.5 and 8.1). Finally, following receipt of the report to inform HRA screening for the Boulby Mine project, Natural England requested further information on traffic activity associated with the proposed development (see Reference A5 below). Following receipt of this information, Natural England confirmed that there was sufficient information available to be able to conclude no LSEs arising from the proposed development (Ref. 4).
A3	5.2.2	"The MAGIC database information is considered to be inadequate for the purposes of the HRA assessment, as discussed previously. The assessment relies upon an assertion that the SAC qualifying habitats are located more than 3.5 km from the mine site, but no clear and verifiable evidence or map is presented for this and the habitats within the 1 km between the SAC boundary (~2.5 km from the mine) and the closest SAC qualifying habitats are not described".	The MAGIC database was utilised as a publicly available data source, however it is accepted that this has limitations. It is considered however that even under a worst-case scenario whereby qualifying habitats are present within the closest section of SAC to the development site (i.e. from 2.5km away), the assessment reasoning and conclusions are still valid.

Reference number	Review paragraph reference	Review comment	Response, clarification or additional information
A4	5.2.2	"In addition to the above, 3.5 km is still well within the identified 10 km zone of influence and no clear information is provided as to how far emissions from the mine can reasonably be expected to affect sensitive vegetation communities".	The 10km zone is referenced within Section 2.2 of the report to inform HRA screening (see EA 2016[13]).
A5	5.2.2	"With regard to road traffic, the Screening report makes assertions about Boulby Mine contributing only a very small proportion of vehicle usage on the road network but does not present or reference ANY evidence of average vehicle movements associated with the mine, particularly HGVs. Without some understanding of the numbers of vehicles and the routes they use it is very difficult to assess the likely impacts of mine activities on sensitive habitats in proximity to roads".	Following a request from Natural England (18 December 2019; Ref. 2)) for additional road traffic information, this was provided by Wood on 09 March 2020 (Ref. 3). Natural England responded on 07 April 2020 (Ref. 4) to confirm that, accounting for the additional information provided, the proposed development would not have a likely significant effect on the North York Moors SAC. Natural England confirmed that the estimated increase in the Average Annual Daily Traffic (AADT) flow would be below the threshold set within Natural England guidance to competent authorities on the assessment of road traffic emissions under the Habitats Regulations (Ref. 8). In addition, Natural England noted the following: • The traffic figures provided are precautionary, having assumed that all vehicle movements to the east will go through the SAC via the A171 road; • Staff numbers, and associated vehicle transits, were significantly higher under the past permission than the current proposal; • A study has shown that road emissions were not a major contributing factor to nitrogen deposition within the SAC (NE 2015); • Unit 113 is intersected by the A171 and is currently in favourable condition; and • The proposed travel plan may provide some mitigation. It is understood that this additional information has not been considered in the review undertaken by Wilkinson Associates (Ref. 6). With the additional information provided it is considered that a likely significant effect can be ruled out.
A6	5.2.2	"The comments above about the use of MAGIC data also apply to the analysis of traffic pollution impacts. It is very difficult to conduct a meaningful review of the assessment in the absence of any maps, plans or other objective information on either the affected habitats or the routes used by vehicles".	Ref. A5 details the additional information regarding traffic emissions that has been provided since submission of the report to inform HRA screening (Ref. 1). This has provided sufficient information for Natural England to be able to conclude no LSE in relation to road emissions arising from the proposed development (see Ref. 4).

[13] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

Reference number	Review paragraph reference	Review comment	Response, clarification or additional information
A7	5.2.3	"With regard to in-combination effects, the Screening report dismisses the potential for any such effects arising either in connection with Boulby Mine or as a result of road and rail travel. However, bearing in mind the comments in Section 5.1 above, even minor and insignificant effects on a European site must be screened for potential in-combination effects. It is absolutely possible for an effect to be insignificant when considered alone, but significant when assessed in-combination with other activities".	Please see Reference A2 above.
Likely significant effects on North York Moors SPA			
A8	5.3.1	"As discussed in paragraph 4.2.2 of this review, we do not consider that disturbance displacement effects on the two SPA qualifying species can be ruled out on the basis of the presented information".	Given that the site is operational and that the development would be an extension of operational time, then it is considered that the effect of disturbance would remain consistent with that currently observed at the site. Regarding golden plover, a study undertaken by Whittingham, Percival and Brown (2000)[14] on the nearby Durham moors highlighted the importance to breeding adults of enclosed fields up to 4km from the nest and up to 2km from the moorland boundary, specifically during the incubation phase (i.e. areas where there are high densities of their preferred earthworm prey). As Boulby Mine lies 2.5km from the moorland boundary, it is considered that a 500m disturbance-buffer around the Site would not fall within the core foraging area for this species during the incubation phase. Golden plover largely forage (around 85%) on moorland during the chick-rearing stage before departing the area after the breeding cycle. Whittingham, Percival and Brown (2000) also found that field size and distance from roads had small but significant effects on field choice (e.g. smaller fields and those near roads were avoided). The results presented by O'Connell *et al* (1996)[15] show that birds tend to avoid the edges of fields. Potentially suitable enclosed fields falling within the 500m potential disturbance zone around the development (i.e. grassland) are generally relatively small, largely bordered by woodland, with poor-sightlines and obvious edge-effects limiting the area of potentially suitable foraging

[14] Whittingham, M.J., Percival, S.M. and Brown, A.F. 2000. Time budgets and foraging of breeding golden plover *Pluvialis apricaria*. In: *Journal of Applied Ecology* 37, pp 632-646.

[15] O'Connell, M.J., Thomas, C.J., Twiss, S.D., Downie, I.S., Evans, P.R. & Whitfield, D.P. 1996. *Functional Ecology of Peatland Animals in the Flow Country of Northern Scotland. I. Habitat Requirements of Breeding Waders (Charadrii)*. Research and Advisory Services Directorate Report. Scottish Natural Heritage, Edinburgh, UK.

Reference number	Review paragraph reference	Review comment	Response, clarification or additional information
			resource. In addition, many of the pasture fields present have been improved (see Phase 1 habitat map within the ES – Figure 3.2 in Appendix 9E) which will limit the number of earthworms present. With respect to breeding merlin, direct disturbance is limited to an area of 300-500m around the nest site, but it is accepted there is potential for disturbance displacement from foraging areas within up to 5km of a nest site. It should be noted that less than 1% of the total SPA area falls within a 5km buffer of the development and this area is dominated by grass moor rather than heather moor and is therefore less suitable for nesting merlin. The citation for the North York Moors SPA[16] states that the merlin breeding population was estimated at 35-40 pairs, although the most recent population estimate for merlin within the North York Moors was 13 breeding pairs in 2018 (Smith and NERF *et al* 2019[17]). There are large areas of suitable foraging habitat around the section of SPA closest to the development site and it is unlikely that any pairs would hunt further away from the nest site than is necessary. It is considered that any disturbance effects on merlin would be negligible given the distance of the development from breeding pairs within the SPA (it is likely the nearest nesting pair is over 5km from the development), the broadly similar habitats in proximity to Boulby in respect to the rest of the local area (e.g. it is well-known that woodland species form a high percentage of the diet of merlins early in the breeding season before meadow pipits have returned to the moors in large numbers, and there is suitable habitat in close proximity to the SPA in the tributary valleys of the Kilton and Staithes Becks) and the fact that the development is currently in operation and therefore provides an on-going level of background disturbance.
A9	5.3.1	"As discussed in paragraph 3.4.13 of this review, no information is presented on the distribution and numbers of the two SPA qualifying bird species (golden plover and merlin) with respect to the mine and its transport links. We are not convinced that LSE on the species can be ruled out when no baseline information is presented, other than a broad comment on their average foraging	Please see Ref. A8 regarding direct impacts from the mine. The key impacts from the transport links are displacement from suitable habitat and nitrogen deposition altering the foraging and nesting habitats of the qualifying species of the SPA. Ref. A5 documents that Natural England have no objection regarding potential impacts to the designated site with regard to transport links.

[16] English Nature, April 2000. North York Moors SPA UK9006161. Version 7.0 classification citation.
[17] Smith, A.J. & NERF *et al*. 2019. *Northern England Raptor Forum Annual Review 2018*.

Reference number	Review paragraph reference	Review comment	Response, clarification or additional information
		ranges (which for both species could potentially extend to the mine site from SPA habitats)".	In summary the increase in AADT is below the standard threshold set by NE's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations when determining a LSE; quoted vehicle movements (see Ref. 3) associated with the development are precautionary; under the current operation, staff numbers and vehicle movements are significantly higher than the proposal; latest research has shown that road emissions are not a major contributing factor to nitrogen deposition on the SAC at current levels; and finally, SAC Unit 113 is currently in favourable condition. The rail route is not likely to have an effect on the SPA's qualifying features given that it is an existing line that is not within proximity to the SPA. It should also be noted that disturbance from vehicular transport is minimal in comparison to visual disturbance relating directly to people, and that displacement from areas of the SPA in proximity to the road (~200m) is an existing impact.
A10	5.3.1	"The assessment only very briefly considers the potential pathways for impacts on golden plover and not at all for merlin, presumably on the basis that the APIS tool states that merlin is not sensitive to nitrogen impacts on its broad habitat. As mentioned in paragraph 4.4.2 the relevance of this assessment is questioned, as APIS also acknowledges that the habitat of merlin is sensitive to nitrogen deposition".	It is considered that the assessment outlined in Section 2.3 (Page 17) of the report to inform HRA screening remains robust for merlin: "*The APIS states that there is no expected negative impact on merlin as a result of nutrient nitrogen, ammonia or NOx deposition impacts on the species' broad habitat – dwarf shrub heath. No adverse impacts on merlin as a result of impacts on the species' supporting habitats for prey species are anticipated, as any shift from heather to grass dominated communities would likely maintain pipit[18] and lark populations. No critical level has been assigned for sulphur dioxide impacts on either species*." Newton (2020)[19] states that nitrogen deposition can impact on heather at rates above 15kg/ha/year, with mat-grass taking over on dry ground and purple moor-grass on damper ground, and also that habitats under sheep grazing and heavy inputs of atmospheric nitrogen will shift towards mat-grass swards rather than heather. The combination of grazing and nitrogen deposition has been responsible for the conversion of dwarf shrub heaths to bracken and grasses in large parts of the Peak District, upland Wales and Galloway. It should also be noted that Newton (2020) documents that where

[18] Smith, A.A., Redpath, S.M., Campbell, S.T. and Thirgood, S.J. 2001. Meadow pipits, red grouse and the habitat characteristics of managed grouse moors. In: *Journal of Applied Ecology 2001* 38, pp 390-400.
[19] Newton, I. 2020. *Uplands and Birds*. New Naturalist Series, Volume: 142.

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			large grazing animals are scarce or absent, then the loss of heather under nitrogen input is much less marked. When the SPA was designated in 2000, around 526 pairs of golden plover were estimated to be present, representing at least 2.3% of the breeding population in Great Britain. The population has increased since the time of designation with nesting density increasing from 1.82 to 2.22 pairs/km^2 during the period 2000-2014[20]. The Air Quality report states that the level of atmospheric pollutants is likely to decrease with the implementation of improved technology over time (Paragraph 7.4.12) and in addition, the conversion to mining polyhalite, which is a purer mineral, will require less processing on site and therefore lead to fewer emissions (Paragraph 7.4.13). It also shows in Figure 7.3 that the prevailing wind direction is south-westerly, which is conducive to nitrogen deposition in a north-easterly direction, away from the SPA.
A11	5.3.2	"There is no consideration of in-combination effects on the SPA. This is appropriate if it can be confidently predicted that there will be no adverse effects on the SPA qualifying species. However, as discussed above we do not consider at present that all possible effects can be ruled out, and if even a slight adverse effect is predicted then it is necessary to screen for potential in-combination effects".	For the reasons outlined above and in the report to inform HRA screening, it is considered that there are no potential direct impacts (or LSEs arising from direct impacts) on breeding golden plover or merlin which would warrant in-combination assessment. In relation to indirect impacts through air pollution resulting in changes to habitats within the SPA, these have been considered in relation to SAC and in-combination effects have been considered above (Reference A2). The approach to considering these designated sites together was accepted by the Secretary of State's HRA for the Tees CCPP project, due to the overlap in location and protection afforded to SAC habitats and SPA supporting habitats. The information provided in relation to Boulby Mine was sufficient for Natural England to be able to conclude that no significant effects were likely.
Likely significant effects on Teesmouth and Cleveland Coast SPA and Ramsar			
A12	5.4.1	"Potential effects on Teesmouth and Cleveland Coast SPA and Ramsar sites are not considered within the Screening report, as	The extension to the Teesmouth SPA has now been approved[21] and includes the addition of breeding avocet and common tern, as well as extending the area to include marine

[20] Natural England. 2019. *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features North York Moors Special Protection Area (SPA). Site code: UK9006161*.

[21] http://publications.naturalengland.org.uk/publication/6619918699069440 European site conservation objectives for Teesmouth and Cleveland Coast SPA. Accessed on 02 October 2020.

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		they were ruled out at the previous stage of the assessment (see paragraph 4.5.1 of this review). For the reasons already mentioned, we do not consider that **adequate objective information** has been presented to rule out possible effects on the SPA or Ramsar, and there may also be a need to **consider the proposed SPA extension**. In addition, as mentioned in paragraph 4.6.2-3 it may also be necessary to consider **in-combination effects** with other developments and also the future proposals for a new development at Tees Dock".	foraging areas and a greater section of the River Tees including docks, harbours etc as far upriver as the Tees Barrage. Section 2.3 (Pages 17 and 18) of the report to inform HRA Screening addresses potential impact pathways associated with Teesmouth and Cleveland Coast SPA and Ramsar sites (as they were at the time of the assessment). This notes that *"Tees Dock is located outside of the SPA / Ramsar boundary and therefore no direct impacts on SPA / Ramsar populations are anticipated as a result of the proposed development. The current arrangement for the transportation of materials would continue to apply to the extended operational period. Transportation of materials by road from Boulby Mine is restricted, due to the availability of the rail link to Teesdock. The proposed extension would not result in any increased disturbance to the Teesmouth and Cleveland Coast SPA bird populations above the current levels, which have been on-going for approximately 40 years.* *Teesport as a whole handles approximately 56 million tonnes of materials per year and over 1,000 ship transits per month, whereas the predicted output from Boulby Mine is approximately three to five ship transits per month."* As outlined in Table 2.5 of the report to inform HRA Screening, it is considered that continuation of existing transportation activities at Tees Dock, which have been on-going for a number of decades and contribute <1% of the monthly ship transits handled by Teesport, would not result in any additional impacts beyond the baseline levels on qualifying features. It is noted that the proposed development includes moving a number of processing facilities outside of the National Park, which is assumed to occur by 2027. Whilst Teesside is the preferred location for this, no commitment has yet been made and other sites in the UK or continental Europe may be considered. Once the location and details for any relocation of processing facilities have been confirmed then that would be subject to a separate EIA and HRA at that time. Natural England (Ref. 2 and 4) have not requested any additional information in relation to potential impacts to the Teesmouth and Cleveland Coast SPA and Ramsar sites and have confirmed that there is sufficient information to be able to conclude no LSEs.

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