

**Verity Allen**

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**Subject:** FW: Cleveland Potash Ltd - Completed Discharge Form for Management Plans under Section 106 NYM/2019/0764/MEIA requirements of planning conditions.

**Attachments:** Cleveland Potash Ltd Scheme of Phased Partial Deconstruction Plan - 55204-P3.pdf; Cleveland Potash Ltd Scheme of Phased Partial Deconstruction Timeline.pdf; EOP15 Lighting Management Plan V0.pdf; EOP 1a Scheme of Air Quality Monitoring and Control V0.pdf; EOP13 Odour Monitoring and Control Scheme V0.pdf; Completed Discharge Form 22.11.2022.pdf

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**From:** Donna Bennison  
**Sent:** 22 November 2022 14:51  
**To:** Planning <planning@northyorkmoors.org.uk>  
**Cc:** Rob Smith <rob.smith@northyorkmoors.org.uk>;  
**Subject:** Cleveland Potash Ltd - Completed Discharge Form for Management Plans under Section 106 NYM/2019/0764/MEIA requirements of planning conditions.

Good Afternoon Planning Admin team,

Please find attached completed Discharge form for Management Plans under Section 106 NYM/2019/0764/MEIA requirements of planning conditions.  
The nominal payment fee of **£116** has been paid over the phone by credit card 22.11.2022 (by Julie Hogan).

- Condition 11 – Scheme of Partial Deconstruction Plan
  - Scheme Of Phased Partial Deconstruction Plan
  - Scheme of Phased Partial Deconstruction Timeline
- Condition 23 – Lighting Management Plan (EOP15)
- Condition 21 – Scheme of Air Quality Monitoring and Control Plan (EOP 1a)
- Condition 22 – Odour Monitoring and Control Scheme (EOP 13)

Please would it be possible to acknowledge safe receipt of Management Plans and provide a receipt for the nominal payment.

Kind Regards

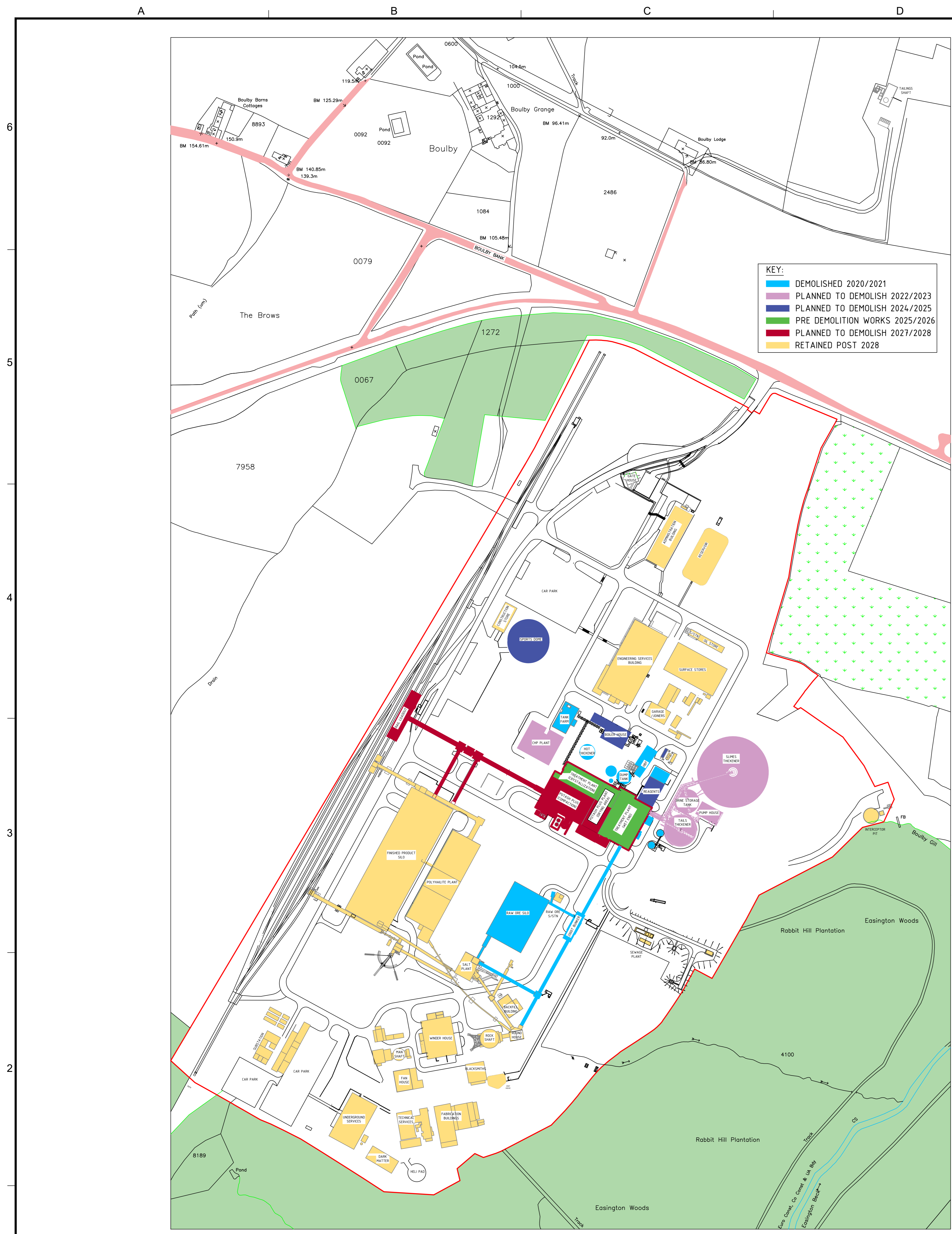
**Donna Bennison**  
ICL Boulby | Development Manager

Boulby Mine Loftus Saltburn Cleveland TS13 4UZ

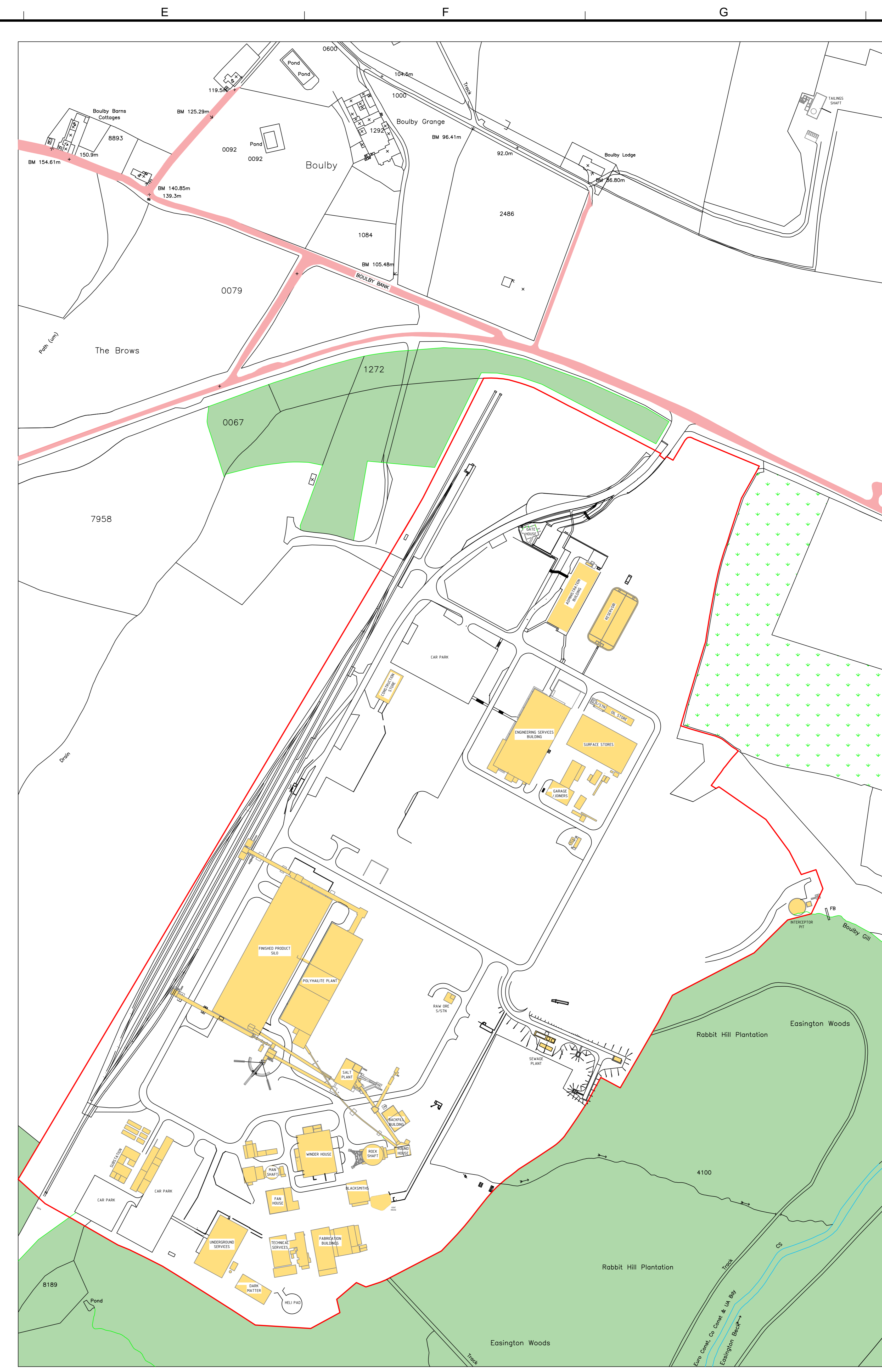
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SITE PLAN SHOWING PROPOSED DEMOLITION PLANS 2020 ONWARDS



PROPOSED SITE PLAN POST 2028

NYMNP  
22/11/2022

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P2	MS 30/09/2022
DEMOLITION PHASE MOVED TO THE END OF 2026	
P3	MS 11/10/2022
TITLE CHANGE FROM POST 2029 TO POST 2028	

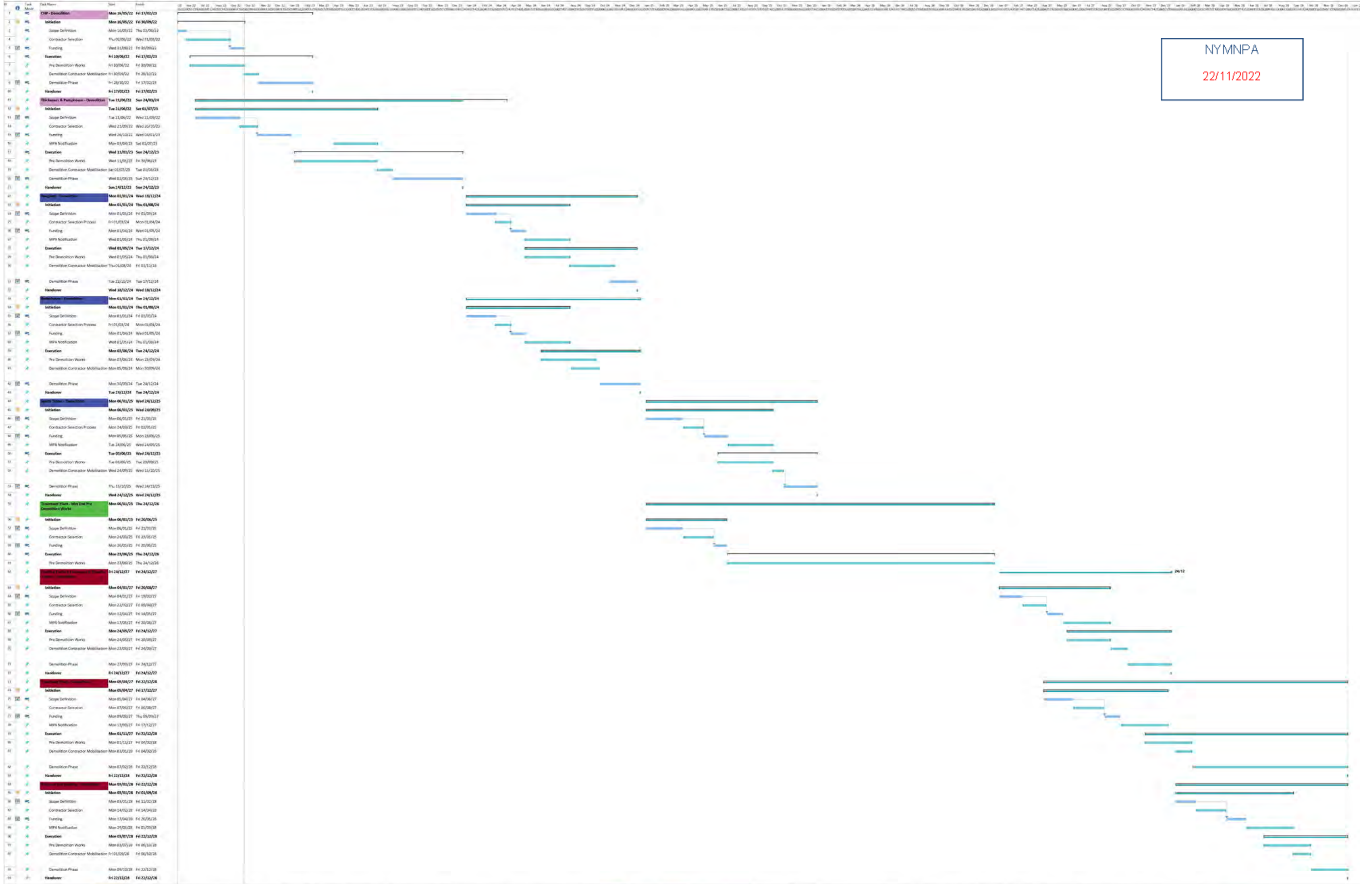
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TITLE:- PROPOSED DEMOLITION PLANNING POST 2020  
DRG No 55204 REVISION P3

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NYMNP A  
22/11/2022

	Standard Operating Procedure		
	Document No:	EOP 15	
	Status:	Live	
Effective:	November 2022	Revision:	0
Owner:	Environmental and Sustainability Manager	Review:	November 2023

## Lighting Management Plan

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<b>PURPOSE</b>	<p>To provide clear, concise and consistent methods for minimising the impact of site lighting to the lowest practical level through best practice mitigation, monitoring and analysis of lighting levels around the site.</p> <p>To demonstrate compliance with statutory requirements.</p>
<b>SCOPE</b>	All aspects of Surface Operations at Boulby
<b>DEFINITIONS</b>	<p><b>LMP</b> – Lighting Management Plan  <b>Enablon</b> – Incident and Near Miss Reporting Software  <b>GoArc</b> – Hazard Reporting Software  <b>BCF</b> – Boulby Community Forum  <b>CPL</b> – Cleveland Potash Ltd  <b>NYMNP</b> - North York Moors National Park  <b>SSSI</b> – Site of Special Scientific Interest  <b>PPG</b> – Planning Practice Guidance  <b>ILP</b> - The Institution of Lighting Professionals  <b>CIBSE</b> - The Chartered Institution of Building Services Engineers</p> <p><b>Light pollution</b> - Light pollution is a term that describes the release of light that serves no useful purpose as it falls outside the required area.</p> <p><b>Sky glow</b> - The release of light into the night sky, brightening the horizon, creates what is known as sky glow (as can be seen over most towns and cities) and reduces the enjoyment of the night sky by reducing the visibility of stars.</p> <p><b>Glare</b> - Another form of pollution is glare, this is where a direct view of the light source presented to the viewer is a visual distraction and may present a hazard depending upon the intensity of the light source and the distance to the viewer.</p> <p><b>UNESCO</b> - The United Nations Educational, Scientific and Cultural Organization  <b>UEL</b> - Ultra Efficient Lighting  <b>CRI</b> - Colour rendering index  <b>PEEPO</b> - People, Environment, Equipment, Procedure, Organisation  <b>CECS</b> - Contractor Environmental Compliance Statement  <b>CDM</b> - Construction (Design and Management)</p>
<b>RESPONSIBILITIES</b>	<p><b>The Environmental and Sustainability Manager (ESM)</b> will ensure that the LMP is reviewed annually or following any significant changes. The EMS will ensure that lighting complaints are reported on the Enablon System. The ESM will</p>

	<p>report all relevant information to the SLT. The EMS will carry out the annual lighting audits.</p> <p><b>Compliance Manager</b> is responsible for arranging audits to monitor compliance of the management plan and providing reminders for the review of all associated procedures.</p> <p><b>Electrical Engineer (Processing)</b> is responsible for the investigation of any lighting complaints and ongoing adherence of the lighting management controls.</p> <p><b>Senior Leadership Team (SLT)</b> are responsible for reviewing the lighting audit findings and setting objectives to mitigate any negative trends, with improvements being assigned timely.</p>
<p><b>LEGISLATION AND OTHER REFERENCES</b></p>	<p>Redcar and Cleveland RCBC/P001/14 permit  Environmental Protection Act 1990, Part III: Statutory Nuisance  North York Moors Local Plan  Planning Practice Guidance (PPG) Light Pollution  National Planning Policy Framework  North York Moors National Park Authority Local plan (July 2020)  NYMNP Design Guide, parts 1 to 5  NYMNP Planning Permission Condition 23  SOP 26 Management of Change  PRO 05 (b) Environmental complaints  BS03 Risk Management  MR 15 EHS Events Reporting and Investigations Rev 5 Apr 22  002  Nuisance Activities and Sources Spreadsheet  The Workplace (Health, Safety and Welfare) Regulations 1992  Health and Safety at Work Act 1974  GN01: Guidance notes for the reduction of obtrusive light (2020)  International Commission on Illumination CIE 150: 2017  Wildlife and Roads, The Ecological, A. Outen  GN 08/18 Bats and artificial lighting in the UK, Bats and the built environment series  Bats and Lighting – Overview of Current Evidence and Mitigation (2014)  “Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats”, Emma L. Stone, Gareth Jones, Stephen Harris  “Bats and streetlamps. The Bats Magazine” Rydell, J. &amp; Baagoe, H.J. (1996)  “The Switch from Low Pressure Sodium to Light Emitting Diodes Does Not Affect Bat Activity at Street Lights” Elizabeth G. Rowse, Stephen Harris, Gareth Jons (2016)  “Street lighting disturbs commuting bats. Current biology” EL Stone (2009)  “Bats and development: with a particular focus on the impacts of artificial lighting” Emma Louise Stone (2011)  “Bats and streetlamps. The Bats Magazine” Rydell, J. &amp; Baagoe, H.J. (1996)  “Abundance of Pipistrellus pipistrellus and Pipistrellus kuhlii foraging at street-lamps” J. Gaisler, J. Zukal, Z. Rehak, M.</p>



	<p>Homolka (1997) "Street lamps and the feeding ecology of insectivorous bats. Symposium of the Zoological Society London" Rydell, J. and Racey, P.A. (1995)  CIBSE Lighting Guide 1: The Industrial Environment  BS EN 12464-2:2014 Lighting of Workplaces, Summary of Lighting Levels  BS EN 12464-2:2014 Light and lighting – Lighting of workplaces Part 2: Outdoor Work Places  BS 5489-1:2013 Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas  Construction (Design and Management) Regulations 2015</p>
<b>TRAINING REQUIREMENTS</b>	Annual Environmental Permit Awareness training for all staff via LMS

## 1. Introduction

### 1.1. Overview

Lighting monitoring and management is a requirement of Planning Permission NYM\_2019\_0764\_MEIA (as detailed below) and this Lighting Management Plan (LMP) sets out details of the measures to be taken to minimise the impact of site lighting to the lowest practical level. This Lighting Management Plan is informed by a lighting audit carried out on 30<sup>th</sup> August 2022.

Planning Permission NYM\_2019\_0764\_MEIA Condition 23:

*"Within three months of the commencement of the development a Lighting Management Plan (LMP) shall be submitted for approval in writing by the MPA. The LMP shall be informed by the undertaking of an updated lighting audit for the Boulby Minehead operational site and set out more details of the measures to be taken to minimise the impact of site lighting to the lowest practical level, including through implementation of the summary lighting mitigation measures identified in the Cleveland Potash Ltd Boulby Mine Night-time assessment dated July 2020 and in particular shall provide details of the following:*

- *The permanent removal of any redundant or unnecessary lighting units identified through the updated lighting audit;*
- *The upgrading of all necessary fixed outdoor lighting units to LED units which are directional and where practicable shielded to provide a zero upward light ratio and with a colour temperature of 3000 °K or less;*
- *The placement of all fixed and mobile lighting units at a low level consistent with functional, security and safety requirements and the need to minimise upward and horizontal light spill from the site;*
- *The use of automated timing and/or proximity activated lighting units where practicable;*
- *The closure of any unnecessary gaps in building cladding to remove the potential for internal lighting to be perceived externally;*

- *The proposed timing for the completion of implementation of the measures set out in i) to v) above which shall in any event be completed within 12 months of the approval by the NPA of the LMP required under the terms of this condition;*
- *The management measures to be taken to ensure that the use of any temporary and mobile lighting units required in conjunction with the development is limited so far as practicable and that any such units are located and directed with appropriate regard to minimisation of horizontal and upwards light spill;*
- *The procedures to be used to check that lighting controls are effective including, if necessary, the identification of additional control measures or the modification or temporary suspension of site operations to prevent unnecessary adverse impact on amenity or the night-time landscape;*
- *The procedures to be used to investigate and take appropriate action to prevent recurrence of complaints of adverse impact from site lighting if indicated via inspections or monitoring;*
- *The Management procedures to be used to identify the roles and responsibilities of personnel on site with regard to lighting management.*

*An updated LMP shall be submitted for approval by 30 June 2028 to reflect changes to site conditions and operations following completion of the Phased partial deconstruction works and otherwise every two years to reflect to reflect other changes in site conditions, operations and activities taking place on site and evolving good practice in mitigation of lighting impacts.*

*Management of lighting shall take place in accordance with such details as may be approved under the terms of this condition.*

**Reason:**

*In the interests of amenity and to accord with the provisions of NYM Local Plan Strategic Policy G and NYM Local Plan Policy ENV 4 and ENV7.”*

## **1.2. Purpose**

The purpose of this LMP is to outline the operation and maintenance procedures for the control of artificial light emissions associated with the operation of Cleveland Potash Ltd (CPL), to enable safe working whilst addressing planning and environmental considerations.

The purpose of this LMP is to ensure that the external lighting provided on the site provides safe lighting for the staff on-site and is functional to allow the safe operation but is also both energy efficient and designed as far as reasonably practicable to minimise its impact on the surrounding environment. It should be noted that internal lighting of buildings does not form part of this document.

The submission of this LMP fulfils the requirements of Planning Permission NYM\_2019\_0764\_MEIA Condition 23.

## 1.3. Site Setting

CPL is situated on the North Sea coast. The nearest village to the north west of the site is Easington at a distance of 1.2 miles and to the East is Staithes village at a distance of 0.5 miles, to the north is the sea and to the south is agricultural and woodland. The site is within the North Yorkshire Moors National Park (NYMNP) and is also on the Heritage Coast. The mine site at Boulby covers an area of approximately 32 hectares. The site facilities include two mineshafts and headgear, the ore processing plants and product storage silos. Other buildings house workshops, stores, laboratories, tailings and offices.

Woodland adjacent to the surface mine facilities has been designated a conservation area in the NYMNP Local Plan. The coastline in the vicinity of Boulby lies within the North Yorkshire and Cleveland Heritage Coast. Within the Heritage Coast, designated bathing beaches include Staithes, Sandsend and Robin Hood's Bay. In addition, the coastline including the nearby historical Boulby Alum works has been designated a Site of Special Scientific Interest (SSSI) for geological reasons.

The company mines Polyhalite (calcium sulphate, magnesium sulphate and sulphate of potash) and processes and sells this as Polysulphate. Polysulphate is also blended with imported Potash to create PotashpluS (permitted until 2027). The site also mines Salt; this is used in both the animal feed market and for road de-icing.

## 2. Policy and Guidance

The following documents have been considered to establish the local policy context and to inform the lighting design and mitigation measures:

### 2.1. The Development Plan

#### 2.1.1. North York Moors National Park Authority Local plan (July 2020)

The North York Moors National Park Authority Local plan was adopted by the National Park Authority on 27 July 2020. The Local plan contains the following policy which is of direct relevance to the LMP: Policy ENV4: Dark Night Skies.

The plan defines the National Park's special qualities which includes: "Dark skies at night and clear unpolluted air".

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".

#### 2.1.1. 2.1.2. Policy ENV4: Dark Night Skies

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”.

### **2.1.2. North York Moors Management Plan**

The North York Moors Local Plan was adopted by the National Park Authority on 19<sup>th</sup> May 2022. The Local plan defines the ‘special quality’ of the NYNP (no. 5) ‘A place of escape from towns and cities, offering a true sense of remoteness and the darkest of skies’ which is of direct relevance to the LMP.

The Local Plan also includes the Vision for the North York Moors which sets out six key outcomes. Outcome 03 is directly relevant to this LMP, ‘A landscape rich in heritage and highly valued for its sense of remoteness and tranquillity’.

### **2.1.3. Special Quality No. 5: A place of escape from towns and cities, offering a true sense of remoteness and the darkest of skies**

Special Quality no. 5 promotes the location of the park in relation to ‘heavily populated areas [providing] easily accessible places to escape and experience our wild, beautiful landscapes and star-filled dark night skies.’ It then further details that ‘The darkest of night skies offer a different kind of escape. In this International Dark Sky Reserve, you can often see 2,000 stars – far more than in the nearby towns – including spectacular views of our own galaxy, the Milky Way.’

### **2.1.1. Outcome 03: A landscape rich in heritage and highly valued for its sense of remoteness and tranquillity**

Objective 9 of Outcome 03 requires the park to ‘Increase the intrinsic darkness of the National Park International Dark Sky Reserve by expanding the current dark sky core zone by twenty percent by 2027.’

### **2.1.2. National Planning Policy Framework**

Section 185 of the National Planning Policy Framework requires that ‘new development is appropriate for its location taking into account the likely effects (including cumulative effects) of [...] the natural environment [...] In doing so they should [...]: limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

### **2.1.3. Planning Practice Guidance (PPG) - Light Pollution**

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".

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 should 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."

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.

### **2.1.4. North York Moors National Park Design Guide**

The NYMNP Design Guide (adopted 2008), parts 1 to 5, was provided as a supplementary planning document to the July 2020 North York Moors Management Plan. As no similar document has been created to support the 2022 Management Plan, the 2008 Design Guide is still relevant:

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".

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. The need to light**

Light pollution & nuisance – People need light to see, and artificial lighting has become an essential requirement for industrial sites. It is provided to encourage a safe environment for a range of activities including providing safe outdoor workplaces, driving, cycling, walking and sporting activities. It is also used to enhance the environment by means of decorative and floodlighting of areas, features and buildings.

Whilst it is recognised that lighting needs to be provided, the incorrect use of such light can become a problem, causing a nuisance and affecting the environment by unwanted light intruding into properties, as well as wasting energy and therefore money. It can also have an impact on the wider environment, including on the night sky, visual amenity and influencing wildlife behaviours. Appropriate measures need to be taken where possible to limit these effects.

The operators of industrial sites are required to consider the health and safety and security of those who work within the area. Consequently, the need for lighting is justified even within Open Countryside. In fact, the operators of CPL have a legal duty of care to ensure a safe workplace is provided.

The Workplace (Health, Safety and Welfare) Regulations 1992, as enforceable under the Health and Safety at Work Act 1974, maintain that safe lighting must be provided in all premises, including outdoor places, for all workplace activities.

### **2.2.1. How much light is required**

The level of lighting depends upon the task to be undertaken to ensure that it can be performed safely. In general, national bodies including British Standards, The Institution of Lighting Professionals (ILP) and The Chartered Institution of Building Services Engineers (CIBSE) prescribe required lighting levels.

It is important that any exterior lighting installation does not over-light, controls energy consumption and avoids light pollution or spill wherever practicable.

### **2.2.2. Light pollution**

Light pollution is a term that describes the release of light that serves no useful purpose as it falls outside the required area.

### **2.2.3. Sky glow**

The release of light into the night sky, brightening the horizon, creates what is known as sky glow (as can be seen over most towns and cities) and reduces the enjoyment of the night sky by reducing the visibility of stars.

### **2.2.4. Glare**

Another form of pollution is glare, this is where a direct view of the light source presented to the viewer is a visual distraction and may present a hazard depending upon the intensity of the light source and the distance to the viewer.

### **2.2.5. Preventing light nuisance**

Through the careful consideration and selection of lighting equipment at the planning and design stage it is possible to ensure that the required lighting levels for the various tasks that will be undertaken in the different areas of the site can be achieved whilst controlling light pollution.

## **3. Existing Baseline Condition**

The lighting infrastructure as shown in the following 2022 images includes:

- Roadway lighting, typically lighting columns;
- Security and operations lighting, comprising of columns, and building mounted luminaires; and
- Lighting emitted from buildings.

### **3.1. Baseline lighting environment**

To obtain a night-time assessment of any lighting on the landscape and visual receptors, a lighting survey was carried out by the Environmental and Sustainability Manager on 30<sup>th</sup> August 2022 between the hours of 19:00hrs and 21:30hrs to record views to illustrate the level of existing illumination.

These survey photos have been compared with the equivalent photos from the July 2021 survey and mitigation updates provided.

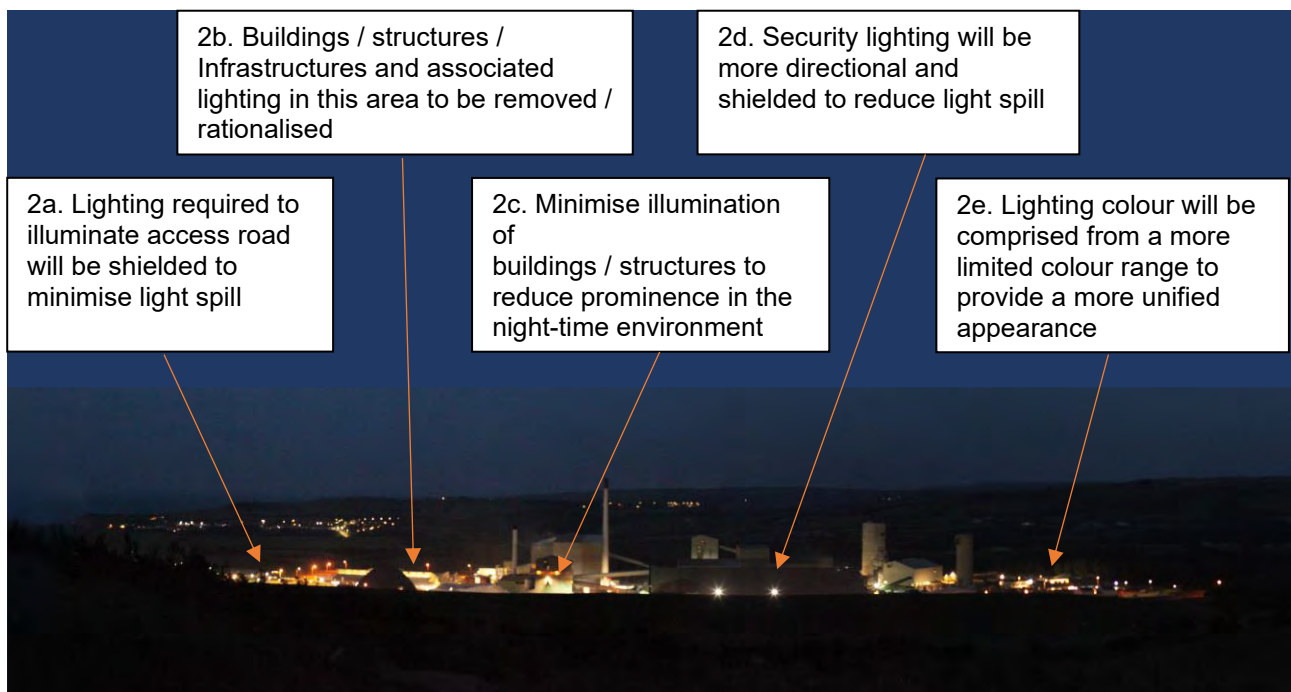
### 3.2. Typical View of Existing Lighting from A174, Ings Farm Holiday Cottages

Image 1: August 2022 Typical view of existing lighting from A174, grid reference NZ 75503 18553



### 3.3. Comparison of August 2022 and July 2021 Lighting Survey view of Lighting from A174, Ings Farm Holiday Cottages

Image 2: A174 July 2021 Lighting Survey Mitigation Strategy



#### August 2022 Mitigation Update:

- 2a. Existing LED lighting from the A174 approach to the Gatehouse, admin carpark and main carpark is planned to be replaced (planned for 2022) with directional smart lighting with reduced spill and improved control (52 units to be replaced)
- 2b. Admin lighting to be updated in line with 2a.
- 2c. Flood lighting on outside of CHP building has been electrically isolated and will no longer operate. Reflection of street lighting will be eliminated by demolition of CHP building in 2022
- 2d. Security lighting has been redirected and shielded
- 2e. Upgrade planned for 2023.



### 3.4. Typical View of Existing Lighting from Staithes

Image 3: August 2022 Typical view of existing lighting from Staithes, grid reference NZ 77881 18125

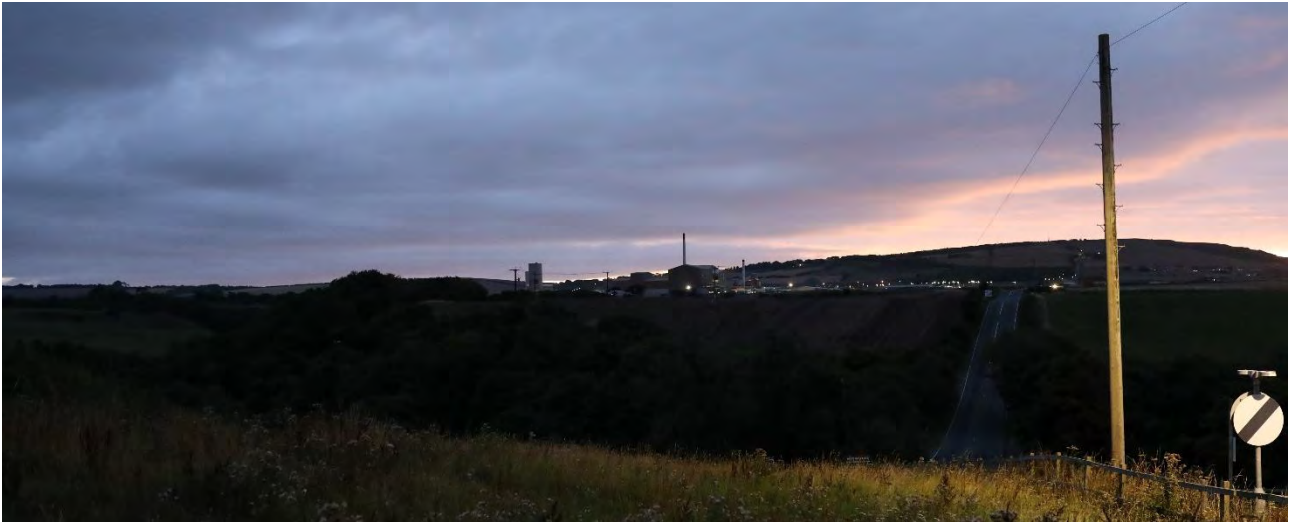
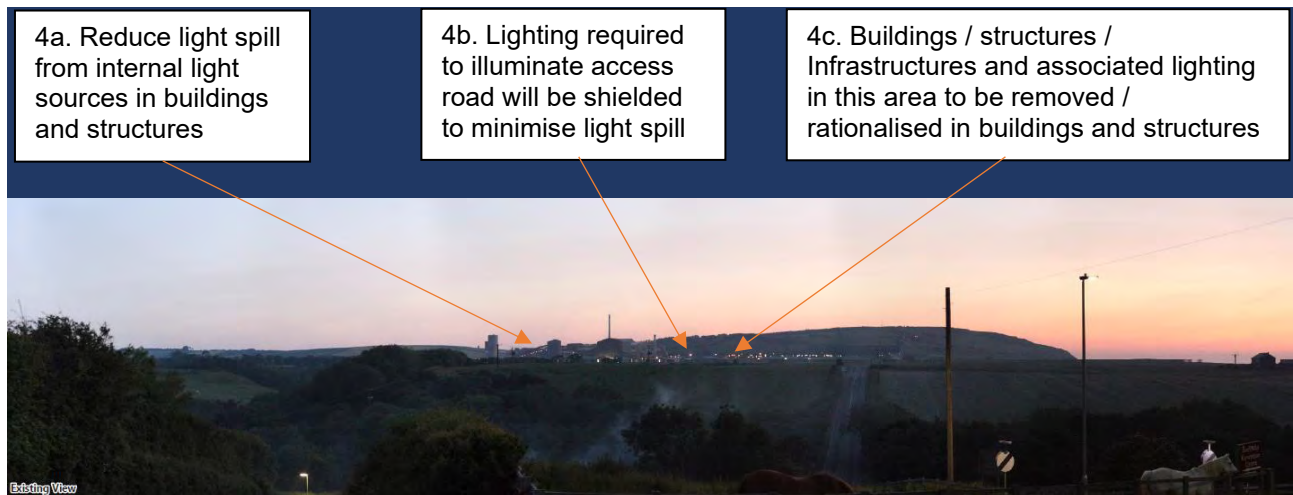


Image 4: Staithes July 2021 Lighting Survey Mitigation Strategy



#### August 2022 Mitigation Update:

- 4a. Pumphouse (due for demolition) lighting has been electrically isolated and no longer operates, which was a visible internal light source.
- 4b. To be upgraded to smart lighting
- 4c. Ongoing upgrading. Rail Load Out lighting due to be reviewed in 2023 and upgraded to directional smart lighting.

Image 5: August 2022 Typical view of existing lighting from Staithes, grid reference NZ 77881 18125 plus identified potential nuisance lighting



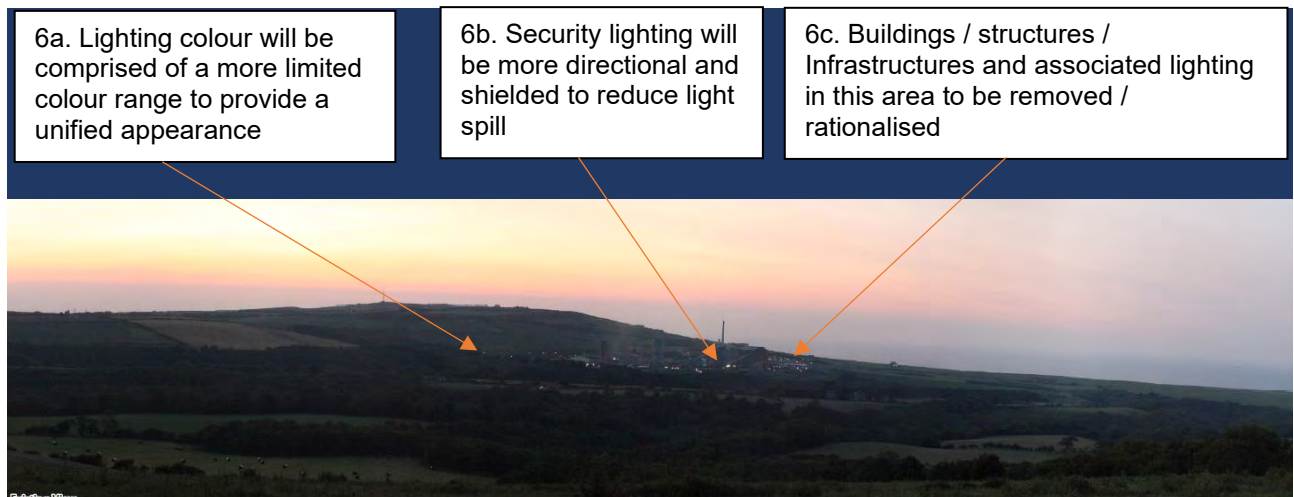
Additional potential nuisance lighting was identified (partly due to demolition works), as shown by the red circles in Image 4. These lights will be reviewed and removed/shielded/redirected as appropriate.

### 3.5. Typical View of Existing Lighting from Roxby

Image 5: August 2022 Typical view of existing lighting from Roxby, grid reference NZ 76444 16431



Image 6: Roxby July 2021 Lighting Survey Mitigation Strategy



August 2022 Mitigation Update:

6a. The site is continuing to upgrade all external existing lighting to directional LEDs as previously mentioned

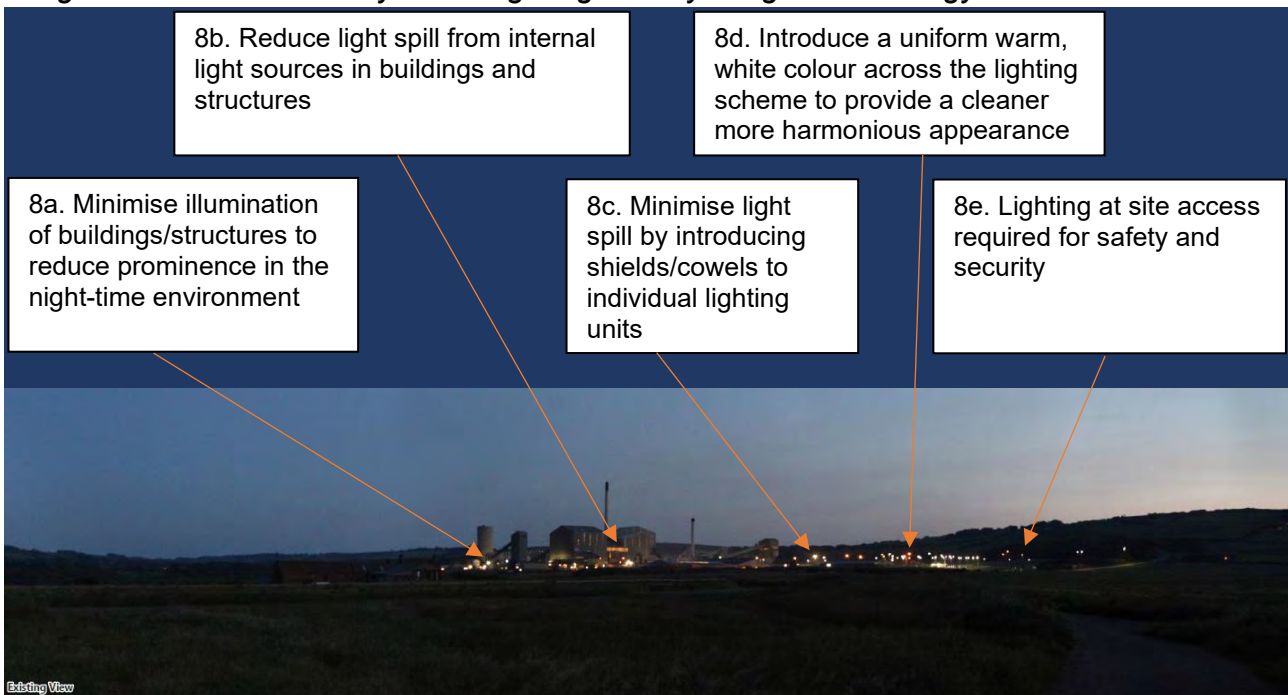
- 6b. Security lighting identified has been redirected and shielded
- 6c. Ongoing upgrading as per 2b, 4c and 6a.

### 3.6. Typical View of Existing Lighting from Cowbar Lane

Image 7: August 2022 Typical view of existing lighting from Cowbar Lane, grid reference NZ 76775 18552



Image 8: Cowbar Lane July 2021 Lighting Survey Mitigation Strategy



#### August 2022 Mitigation Update:

- 8a. Upgrading of lighting planned for 2023 to LED smart lighting.
- 8b. Review of sheeting repairs and replacements is ongoing as damage/losses occur
- 8c. Ongoing upgrading as per 2b, 4c and 6a.
- 8d. Ongoing upgrading as per 2b, 4c and 6a.
- 8e. Upgrading to directional smart lighting in 2022

### 3.7. Planned works

In line with requirements of the site's Planning Permission, CPL will be working to complete various lighting improvements within 12 months of the approval of the LMP.

These works are being undertaken as required following failure of existing lighting equipment as well as part of larger projects, therefore no specific timescales are available within the 12-month period. Certain projects have already been completed as shown in Table 1.

*Table 1: Planned Works*

<b>Planned Work</b>	<b>Completion Date</b>	<b>Comments</b>
The permanent removal of redundant or unnecessary lighting units identified through the ongoing lighting audits.	Complete for all identified units.	All redundant or unnecessary lighting units have been removed.
The upgrading of all necessary fixed outdoor lighting units to LED units which are directional, shielded, controlled by sensors, timers or switches and have a relatively uniform warm white colour temperature of <3000°K.	May 2024*	The ongoing replacement of existing lighting with those detailed under Planned Work will continue until all external lighting complies.
Reducing the level of lighting units wherever practicable in relation to functional, security and safety requirements	May 2024*	The ongoing replacement of existing lighting with those detailed under Planned Work will continue until all practicable external lighting complies.
Gaps in building cladding will be filled to remove the potential for internal lighting to be perceived externally and pollute the night-time environment	Continuous	As gaps appear this planned work will be completed

\* *The completion date has had to be extended due to the availability of groundwork contractors and delivery timescales of materials.*

## **4. Environmental considerations**

### **4.1. General**

There are various environmental considerations that need to be taken into account when considering the installation of exterior lighting. These are the direct energy usage, the visual impact of the lighting equipment during the day, the effect of light spillage on surrounding areas, the spill of light into the night sky, and the effects on human receptors, animal, plant life and surrounding landscape.

In December 2020, the NYMNP were designated an International Dark Sky Reserve by the International Dark-Sky Association. This consideration must also be taken into account when considering the installation of exterior lighting.

The Institution of Lighting Professionals (ILP) document “GN01: Guidance notes for the reduction of obtrusive light (2020)” and International Commission on Illumination CIE 150: 2017, establish five Environmental Zones, as provided in Table 2. Each zone has a different approach to the provision of external lighting. These zones establish ‘Obtrusive

Lighting Limitations for External Lighting Installations’ and include the effects of ‘Sky Glow’ and maximum values of vertical illuminance on properties. The document also includes ‘limits for the luminous intensity of bright luminaires’; the potentially obtrusive direction of light outside the area being lit.

*Table 2: ILP GN01 Maximum values of vertical illuminance on properties*

Light Technical Parameter	Application Conditions	Environmental Zones				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (Ev)	Pre-curfew	n/a	2lx	5lx	10lx	25lx

The limits published within these documents set upper performance levels above which the lighting would be considered as a nuisance within each environmental zone.

In general, the effect of distance from the lighting source / installation has the effect of reducing the lighting levels falling on a surface but has little effect regarding source intensity which tends to be more affected by the background against which it is viewed. In basic terms, a bright torch shining towards an observer will appear brighter when the background it is viewed against is darker than it would, say, in a town or city centre which is likely to have high background lighting levels.

The five environmental zones are defined as detailed in Table 3.

*Table 3: ILP environmental zones classification*

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO starlight reserves, International Dark sky parks
E1	Natural	Intrinsically dark	National parks, Areas of Outstanding Natural Beauty etc.
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations.
E3	Suburban	Medium district brightness	Small town centres of suburban locations.
E4	Urban	High district brightness	Town/city centres with high levels of night time activity.

The environmental zones are normally grouped as E1/E2 and E3/E4 and are considered as rural and urban respectively.

The International Dark Sky Association (IDA) appreciates that modern society requires outdoor lighting for a variety of needs, including safety and commerce. The IDA recognizes this but advocates that any required lighting be used wisely. To minimize the harmful effects of light pollution, lighting should

- Only be on when needed
- Only light the area that needs it
- Be no brighter than necessary
- Minimize blue light emissions
- Eliminate upward-directed light

Based upon the lighting baseline condition, the information above and the limits within Table 2, the area of development is considered to be in a dark area and, as such, any lighting installed should be designed to meet the limitations laid out for an E0 Environmental Zone.

## **4.2. Flora and Fauna**

From the point of view of the impact of artificial lighting on wildlife, there have been a number of reports published over the years with the main focus being on bats, however a document that looks at the broader wildlife is 'Wildlife and Roads, The Ecological Impact' which incorporates a section regarding 'The ecological effects of road lighting on wildlife' by A. Outen. He has investigated the general impact of artificial lighting on wildlife and in conclusion has found that the colour temperature of the light source used is significant to its impact on the wildlife.

Outen's research shows that the use of:

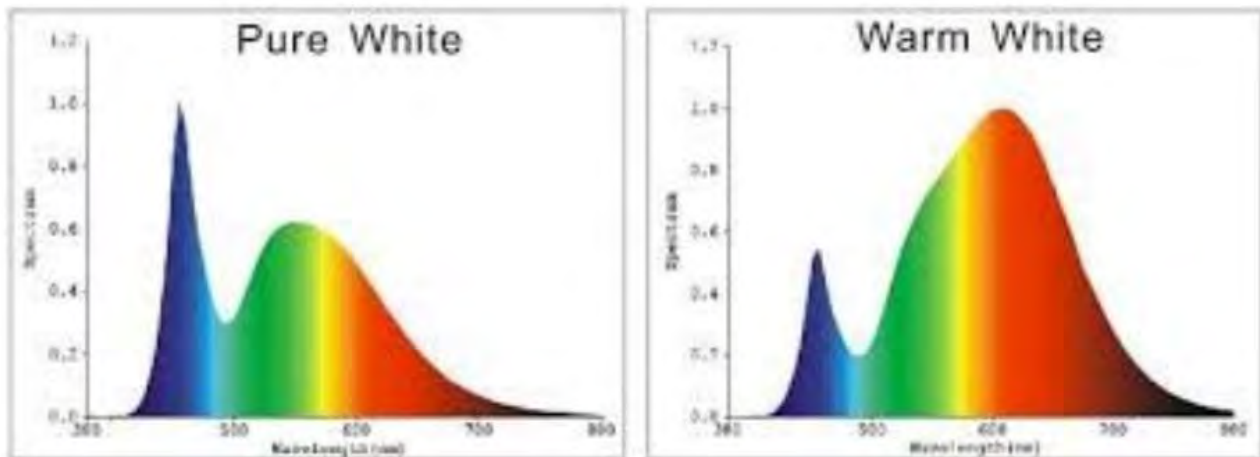
- Low Pressure Sodium (SOX) light sources, an orange monochromatic source, has a negligible affect;
- High Pressure Sodium (SON) lighting, a more golden light source, has minimal effect and attracts insects;
- White Lighting (Metal Halide, CDO, CPO, PLL,) has a significant effect on wildlife, disrupting its 24 hour cycle in part due to the high ultraviolet (UV) content of the light to which insects in particular are very sensitive.

Additional research carried out by many others has shown that the disturbance of insects in relation to the use of artificial lighting has a knock-on effect to the 24 hour patterns of other wildlife such as birds and bats.

The development of LEDs as a viable lighting technology has led to this technology becoming an energy-efficient alternative to the conventional light sources more commonly associated with highway and exterior lighting installations. LED technologies with higher energy efficiencies, long life and colour rendering properties are a viable and cost-effective alternative. However, research into the effects of such light sources on bats is in its infancy and no definitive answers can be formed as to how light produced by an LED light source affects bats. It is known that bats are affected by light sources that have high UV levels, and broad-spectrum lights, particularly those with high blue light content, and these should be avoided or their use kept to a minimum where practicable to minimise their effects.

It should be noted that very few light sources utilised in exterior lighting actually emit UV, UVA or UVB, and those emissions are normally filtered out by the lamps' glass envelope or the glazing on the lantern / optics. Focus is therefore on the blue content within the spectrum of a light source and the effect this may have.

Plate 1: Colour spectral charts for cool and warm LEDs (note the difference in blue content)



The following section provides some general guidance on bats and artificial lighting; more specific site management and mitigation measures are provided in later sections of this report.

The Institution of Lighting Professionals (ILP) in collaboration with the Bat Conservation Trust have recently published GN 08/18 Bats and artificial lighting in the UK, Bats and the built environment series. This document is aimed at lighting professionals / designers, planning officers, developers, bat workers / ecologists and anyone who specifies lighting. It is intended to raise the awareness of the impacts of artificial lighting on bats and suggests mitigation measures for various scenarios, rather than to replace a site specific ecological and lighting assessment / management plan.

As further research has been carried out, our understanding of how artificial lighting impacts bats is ever increasing. Some of the key findings are:

- Artificial lighting is thought to increase the chances of predation and so bats may modify their behaviour.
- Different types of luminaires and light sources emit different spectrums of light. See Plate 1. This has an impact on the number of insects that will be drawn to the light source.
- Illumination of a bat roost can cause disturbance and may result in the colony abandoning the roost or even becoming entombed within it.
- Illumination of the entrance to a bat roost may delay bats from emerging and will potentially shorten foraging times. Lighting may also impact on flight paths and commuting routes
- Lighting in addition to disturbance at the roost may also affect feeding behaviour. There are two elements to this a) certain light sources attract a range of insects and this may alter foraging habits. b) the presence lit conditions may act as a barrier to movement.
- Illumination of drinking resources such as water ways, ponds and cattle troughs can stop bats from drinking.
- Some impacts on bat migration have also been studied.

In summary, artificial lighting does have an effect on all species of bats to a greater or lesser extent for all their night-time activities. Where bats are present or likely to be present, a professional ecologist's advice should be sought, and the lighting designed to mitigate any impacts as far as practically possible.

### **4.3. Lighting Design Considerations**

#### **4.3.1. Where Bats Are Present**

As previously stated, the operators of CPL have a legal duty of care to ensure a safe workplace is provided. Therefore, artificial lighting will be required; light pollution, obtrusive light and its effect on flora and fauna in the surrounding environment must also be considered

The first question that must be answered is "Do I need to light it?". If so, then the lighting should be designed under the principal of Ultra Efficient Lighting (UEL) which means that the right light will be provided at the right time, in the right place, controlled by the right system. This is effectively broken down as follows:

- Right light – look to the correct application of the lighting standards which define the required lighting levels dependent upon the tasks being undertaken and the level of activity. This also looks to the use of the right light source which should be as energy efficient as possible and will include due consideration of LED lighting whilst also taking due consideration of the mitigation requirements for the impact of the light source on bats, wildlife and the wider environment as previously identified.
- Right time – the standards permit light levels to be changed dependent upon use, i.e. when activity levels fall then the light levels can be redefined. With respect to this development, the lighting will need to be in situ for site workers, and to provide security during the hours of darkness to ensure safe navigation within the site.
- Right place – ensuring that only the tasks which need to be lit are illuminated, reducing spill and obtrusive light. This is achieved through the careful consideration of luminaires and how they are mounted / installed.
- Right system – the most energy-efficient lighting installation requires a suitable control system that could also permit monitoring and its remote operation (dependent on the operating parameters).

A key element where bats are present is the type of light source employed. Lighting professionals have a palette of sources available to them ranging from the 'old' High Pressure Sodium (golden) lamps through to metal halide and now LEDs, and many more. These sources all have different spectra and thus, from a human perspective, different abilities to render (replicate) colours accurately. This is described as their colour rendering index (CRI), illustrated on Plate 2; denoted Ra, and measured on a scale of 0 to 100, the CRI indicates how well a source replicates colours based upon day-light conditions: a score of 0 being no colour rendering through to 100 being (equivalent to) daylight.



Plate 2: Colour rendering index (CRI)



Table 4 gives indicative colour-rendering recommendations for various areas and tasks.

Table 4: Indicative colour rendering index recommendations

Area	Application	Minimum Ra
Roads/footways	Walkways exclusively for pedestrians.	20
Roads/footways	Traffic areas and roads for slow moving vehicles, max 6mph (e.g. trucks & excavators).	20
Roads/footways	Regular vehicular traffic (max 25mph).	20
Roads/footways	Pedestrian passages, vehicular turning. Loading and unloading points.	20
Outdoor working & storage areas.	Short-term handling of large units & raw materials, loading & unloading of solid bulk goods.	20
Outdoor working & storage areas.	Continuous handling of large units and raw materials, loading & unloading of freight lifting and descending location for cranes, open loading platforms.	20
Outdoor working & storage areas.	Reading of addresses, covered loading platforms, use of tools, ordinary reinforcement and casting tasks in concrete plants	20
Outdoor working & storage areas.	Demanding electrical, machine and piping installations, inspection (use local lighting).	60
Security	Vehicle storage areas, industrial yards and storage areas; vehicle storage areas element mould, timber and steel storage, building foundation hole and working areas on sides of the hole at building sites etc	20
Security	Checkpoints	80
Security	Gatehouses	80

These days, with the wider use of LEDs, the use of white light sources with an Ra>60 is more common.

With the introduction of LED light sources, we also need to understand Colour Temperature, which is a measure (in degrees Kelvin) of how ‘warm’ (2000 to 3000k) or ‘cool’ (4000 to 6000k) the colours appear, as shown in Plate 3 below. The higher colour temperature sources appear cooler with a higher blue light content.

Plate 3: Colour rendering examples; cool white (left) to warm white (right)



Research across Europe is showing that amber light has a negligible effect on wildlife. We are therefore starting to see certain suppliers of LED products presenting a more wildlife-friendly product in which the blue wavelength is minimised, and the light has a more golden / amber feel to it, whilst still providing good colour rendering and performance.

#### 4.3.2. Summary of impacts of light types on bats

Studies continue to look at the comparative impacts of different light sources on different bat species and behaviours. However, Table 5 extracted from ‘Bats and Lighting – Overview of Current Evidence and Mitigation’ (2014) provides a good summary of what is known of existing light sources and the likely effects on bats and their behaviours. This table should be used as a guide and general summary only as research is always ongoing.

Plate 4 is an extract from ‘Bats and Lighting – Overview of Current Evidence and Mitigation’ and provides a good guide for the impacts of light types on bats as identified in Table 5.

Plate 4: Relative impact of types of lights on bats (guidance only)

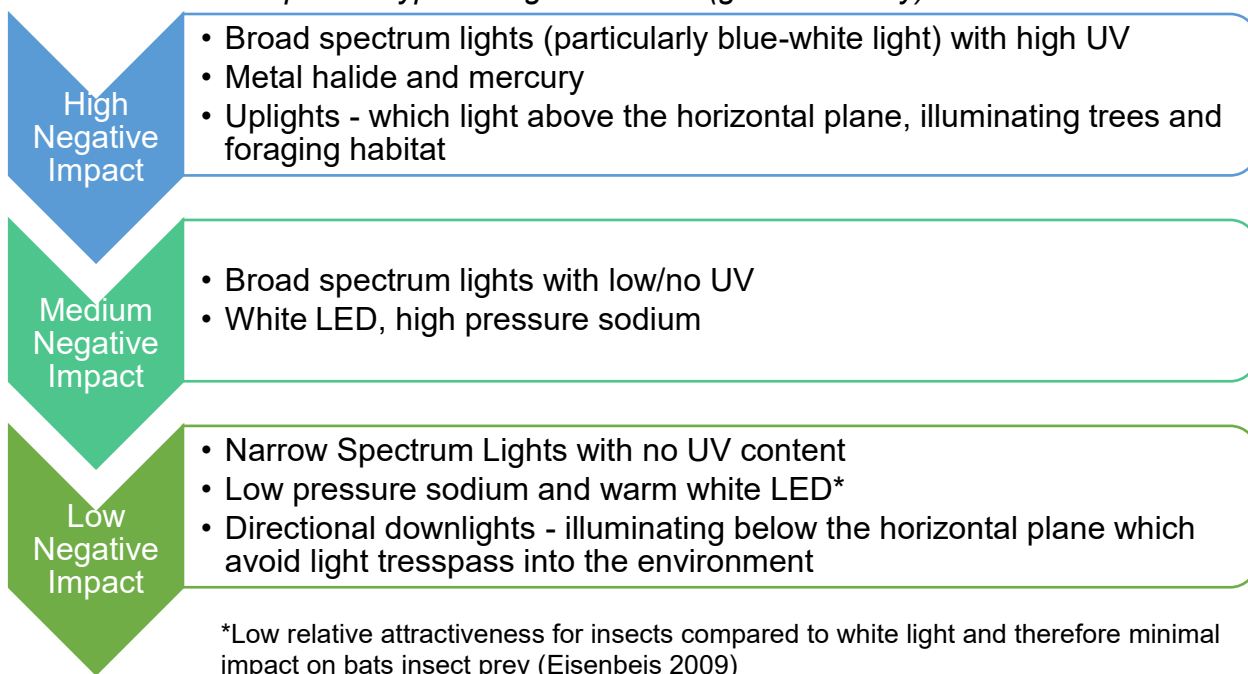


Table 5: Extracted from 'Bats and Lighting – Overview of Current Evidence and Mitigation'

Light Type	Species	Impact	Evidence
White LED.	Rhinolophus hipposideros and Myotis spp.	Reduced activity and special avoidance of commuting routes.	"Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats", Emma L. Stone, Gareth Jones, Stephen Harris
Warm white LED.	Unknown at present.	Unknown – though likely to have less impact on light-sensitive species than white light types.	
Low pressure sodium.	Nyctalus noctula.	Increased activity and foraging.	"Bats and streetlamps. The Bats Magazine" Rydell, J. & Baagoe, H.J. (1996)
	Pipistrellus spp.	No significant increase in activity compared to dark areas.	"The Switch from LowPressure Sodium to Light Emitting Diodes Does Not Affect Bat Activity at Street Lights" Elizabeth G. Rowse, Stephen Harris, Gareth Jons (2016)
High pressure sodium.	Rhinolophus hipposideros and Myotis spp.	Reduced activity and spatial avoidance of commuting routes; delayed commuting time.	"Street lighting disturbs commuting bats. Current biology" EL Stone (2009) "Bats and development: with a particular focus on the impacts of artificial lighting" Emma Louise Stone (2011)
	Pipistrellus spp., Nyctalus noctula, Eptesicus serotinus	Increased activity and foraging.	"Bats and streetlamps. The Bats Magazine" Rydell, J. & Baagoe, H.J. (1996)
Compact fluorescent.	Unknown at present.	Unknown – though likely to have a similar impact on light sensitive species as other white light types.	
Mercury vapour lamps	P. pipistrellus and Pipistrellus spp., Eptesicus spp.	Increased activity ("Seasonal use of illuminated areas by foraging northern bats" (Ref. 1.6)) recorded increased activity of Eptesicus nilssonii (a species not present in the UK) at mercury vapor lamps in Sweden in spring.	"Abundance of Pipistrellus pipistrellus and Pipistrellus kuhlii foraging at street-lamps" J. Gaisler, J. Zukal, Z. Rehak, M. Homolka (1997) "Street lamps and the feeding ecology of insectivorous bats. Symposium of the Zoological Society London" Rydell, J. and Racey, P.A. (1995)

## 5. Operational Phase Lighting Management Plan

### 5.1. Lighting Objectives

The primary objective of lighting during the operational phase is to provide illumination for the safe operation of the site and provide a safe working environment in the absence of natural light allowing workers and site traffic to safely navigate the site and to provide security lighting.

As discussed earlier, the site sits in a sensitive environment and has been assessed as being within an E0 Environmental Zone. The woodland adjacent to the site also supports a valuable assemblage of bats. The required lighting therefore needs to be designed to minimise impact on the surrounding environment and receptors.

The objectives of this section of the LMP shall be to achieve the following:

- Provide a safe working environment, meeting statutory requirements and standards.
- Allow 24hr working (when required).
- Provide site security lighting.
- Mitigate the impact of artificial lighting on the surrounding environment and residential amenity.
- Manage lighting to the minimum practicable level.

### 5.2. Areas to be lit and Associated Activities

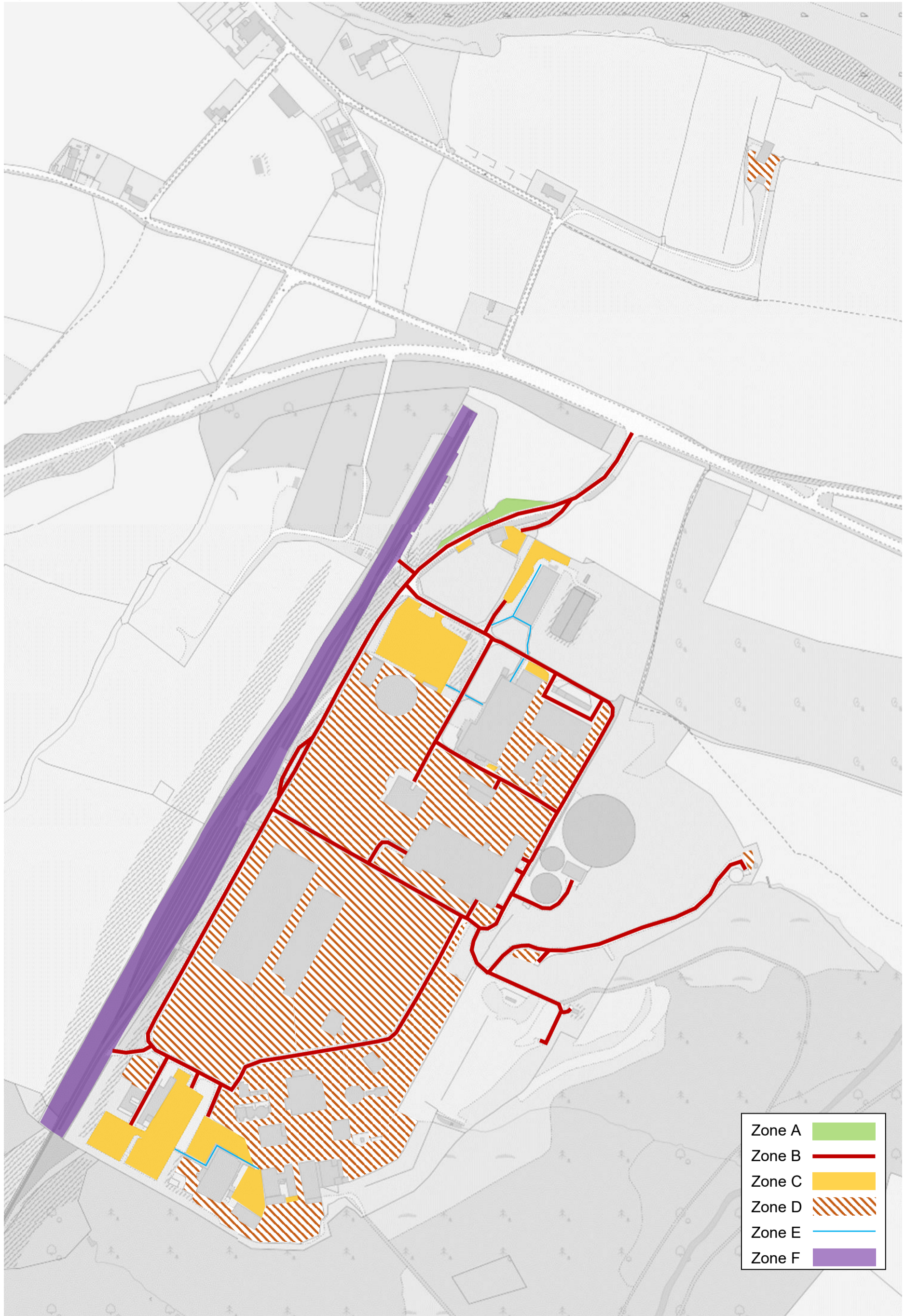
For the operational phase, the zones detailed in Table 6 have been identified along with the associated activity or task being undertaken as requiring lighting. For details of the zones please refer to Figure 1.

*Table 6: Operational zones and activity/tasks being undertaken*

<b>Zone</b>	<b>Description</b>	<b>Activity/Task</b>	<b>Comments</b>
Zone A	Vehicle search areas.	Illumination of security check points with additional task lighting to carry out security searches of vehicles entering or leaving the site.	Timed and sensor operated LED lighting will be required in these areas. The timer settings will be dependent on shift pattern and ambient lighting levels. The timer specifics will be based on lux levels with sensor outside of these hours.
Zone B	Internal roads	Illumination of all dedicated roadways inside the security fence, to allow safe vehicle operation.	Intensively used roadways will require timed and sensor LED operated lighting in these areas. The timer settings will be dependent on shift pattern and ambient lighting levels. The timer specifics will be based on lux levels with sensor outside of these hours.

			Low usage roadways will have sensor operated LED only.
Zone C	Car parks	Permanent car parking areas	Intensively used carparks will require timed and sensor LED operated lighting in these areas. The timer settings will be dependent on shift pattern and ambient lighting levels. The timer specifics will be based on lux levels with sensor outside of these hours. Low usage carparks will have sensor operated LED only.
Zone D	Hardstanding and process areas	Dependant on the nature of the process area / hardstanding, this can include storage	Sensor operated LED
Zone E	Footpaths	Illumination of dedicated footpaths inside the security fence, to allow safe pedestrian movements.	Sensor operated LED
Zone F	Railway	Illumination of the railway, sidings and loading facilities to allow all rail activities to be undertaken safely. Additional task lighting to carry out maintenance activities may be required.	Timed and sensor operated LED lighting will be required in these areas (timed/sensor is dependant on railway movements and ambient lighting levels.) Timer specifics based on lux levels with sensor outside of these hours.

Figure 1: Operational zones



## 6. Mitigation Measures

A range of mitigation measures are available to address the potential impact from the site lighting. These range from equipment choice, use of site topography and competent design and site management.

The following mitigation measures shall be adopted for both fixed and temporary lighting.

- Adopt the lowest safe lighting levels possible for task being undertaken.
- Limit the hours of lighting where practicable.
- Use a high-quality luminaire with asymmetric lenses whenever practicable, to minimise light spill.
- Use the lowest possible mounting for the luminaire based on the required level of illumination needed for the task being undertaken.
- Direct luminaires into the area to be lit (light from the boundary inwards).
- Ensure the luminaire is mounted at zero degrees to the horizontal and avoid any tilt.
- If required, make use of manufacturer supplied custom shields.
- Install smart lighting (sensors/timers) wherever practicable, to ensure only areas in use are lit
- Provide local control for the lighting so it may be switched off when not required.
- All lighting units shall have a 'warm light' i.e., 2000 to 3000K.

In addition to the physical equipment, lighting should be placed such that it makes use of the existing and proposed topography:

- Keep mounting heights lower than fences and bunding, where possible.
- Position equipment so it is not visible to sensitive receptors by using natural screening.
- Prior to the use of any lighting on-site the lighting shall be inspected and signed off by the designers to ensure it has been installed as per the design and the specified equipment and optics are installed.
- During routine lighting maintenance activities by the electrical department, the lighting installation shall be inspected to ensure the correct tilt angles and aiming directions are maintained throughout the life of the installation. If any equipment is found to be incorrectly aligned modifications will be made to ensure it is restored to as designed and if required re-inspected. This monitoring procedure will ensure that during the time the site is occupied the levels of lighting in the required areas on-site are maintained in accordance with current best practice and standards whilst ensuring the potential impact associated with the introduction of lighting on identified receptors is controlled and minimised as far as practicably possible.

### 6.1. Sensitive Areas

#### 6.1.1. Bat sensitive areas

All habitats adjacent to the operational site, notably but not limited to the areas of woodland should be kept as dark as reasonably practicable.

### **6.1.2. Lighting mitigation measures to be adopted in proximity to bat commuting routes / flightpaths**

The best mitigation when considering lighting in the proximity of a bat roost or commuting routes / flightpath is avoidance where reasonably practicable

Where lighting is unavoidable then, in addition to the points made in the Mitigation Measures section, the following additional mitigation measures where reasonably practicable shall be adopted for both fixed and temporary lighting:

- Use a light source that has a narrow spectrum with no UV content.
- Use a tuneable LED luminaire.

### **6.1.3. Operational site buildings**

The operational site has a mixture of buildings of varying heights and materials. To help mitigate the impact that these may have on the night sky the following measures should be put in place.

- Site buildings – Any lighting attached to site buildings should be fully cut off (emitting no light above the horizontal).
- Site buildings – Where reasonably practicable avoid light coloured paint finish to reduce reflectivity.
- Site buildings - Gaps in building cladding would be filled to remove the potential for internal lighting to be perceived externally and pollute the night-time environment

## **6.2. Lighting Equipment & Controls**

### **6.2.1. Luminaires**

The lighting design for the operational site will use a mixture of high-quality highway luminaires and area projector luminaires. All luminaires used will be capable of having manufacturer shields or louvers fitted if required to ensure no light is emitted above the horizontal. All lighting installations will be planned to meet requirements to emit no light above the horizon. If upon installation this is not possible due to the fixing/location, a shield or louver will be installed. This will be assessed at the point of installation.

### **6.2.2. Control**

All lighting installed shall have some form of control to suit the tasks being undertaken and ensure energy is not wasted (lights should not be left on continuously).

Task lighting – In general, task lighting will only be used during specific times at specific locations and will have manual switching.

Ambient lighting – Ambient lighting will be required to operate as required dusk to dawn as required by passing vehicles and pedestrians, so the most suitable method of control will be timers based on lux levels plus sensor control to ensure that unused areas are not lit.



Access control points – At access control points, there will be the need to increase the ambient lighting when there is the need to undertake an inspection etc. This lighting will be controlled as the Ambient Lighting above. Additional task lighting, specifically torches, will be available to the security team, if required.

### **6.3. Abnormal Activities Lighting Management Plan**

Abnormal activities are primarily construction and demolition projects; however, emergency works of any nature will also adhere to these controls whenever practicable. Abnormal activities will generally be managed by contractors and this plan will be shared with them to ensure all controls are in place to the standard expected by CPL and its stakeholders.

#### **6.3.1. Lighting Objectives**

The primary objective of lighting during the abnormal activities is to provide illumination for construction/demolition/emergency activities providing a safe working environment in the absence of natural light, allowing workers and site traffic to safely undertake various tasks and to provide security lighting.

As discussed earlier, the site is considered to be within an E0 Environmental Zone. The woodland adjacent to the site also supports a valuable assemblage of bats. The required lighting therefore needs to be designed to minimise impact on the surrounding environment and receptors.

The objectives of this section of the LMP are to achieve the following:

- provide a safe working environment, meeting statutory requirements and standards;
- allow 24hr working (when required);
- provide site security lighting; and
- mitigate the impact of artificial lighting on the surrounding environment and residential amenity as far as reasonably practicable.
- Manage lighting to the minimum practicable level.

#### **6.3.2. Required Lighting Levels**

Due to the potential dynamic nature of abnormal tasks, there will be the need for different levels of illumination needed for certain tasks or stages in the process in order to provide a safe working environment. Some areas will require suitable task lighting while other areas will require a level of ambient lighting.

Task lighting – Task lighting will typically be provided for abnormal activities and the required levels will vary depending upon the type of activity being undertaken. For example, clearance, excavation and loading typically requires an average of 20 lux, whereas undertaking fine work such as framework element mounting, light reinforcement work, wooden mould and, electric piping and cabling typically require an average of 100 lux or more. The standard which sets out the required lighting levels for the various tasks that will need to be undertaken is BS EN 12464-2:2014 Light and lighting – Lighting of

workplaces Part 2: Outdoor Work Places. It shall be the responsibility of the appropriate Contractor to undertake the design of any required task lighting making sure it meets with the required standards and the recommendations/restrictions set out within this LMP and is submitted to CPL for approval prior to installation

Ambient lighting – Ambient lighting will be provided to aid the safe navigation for areas such as access roads, footpaths, car parks contractors' compounds and accommodation areas. This lighting will, whenever practicable, be timer and sensor controlled. Typical levels will be an average of 5 to 30 lux, depending on the area to be lit. The standard which sets out the required lighting levels for the various tasks that will need to be undertaken is BS 5489-1:2013 Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas. Where ambient lighting is identified as 'required', it will be implemented whenever natural light levels are insufficient.

## **6.4. Mitigation Measures**

### **6.4.1. Planned Abnormal Mitigation Measures (Construction/Demolition)**

A range of mitigation measure are available to address the potential impact from planned activities such as construction lighting. These range from equipment choice, use of site topography and competent design and site management.

The following mitigation measures shall be adopted for both fixed and temporary lighting wherever practicable:

- adopt the lowest safe lighting levels possible for task being undertaken;
- limit the hours of lighting where practicable;
- use a luminaire with good optical control;
- use the lowest possible mounting for the luminaire based on the required level of illumination needed for the task being undertaken;
- direct luminaires into the area to be lit (light from the boundary inwards);
- ensure the luminaire is mounted at zero degrees to the horizontal and avoid any tilt;
- if required, make use of manufacturers' supplied custom louvres; and
- Install smart lighting (sensors/timers) wherever practicable, to ensure only areas in use are lit
- Provide local control for the lighting so it may be switched off when not required.
- Use asymmetric lenses whenever practicable, to minimise light spill.
- All lighting units shall have a 'warm light' i.e., 2000 to 3000K.

In addition to the physical equipment, wherever practicable lighting should be placed such that it makes use of the existing topography.

- Keep mounting heights lower than fences.
- Position equipment so it is not visible to sensitive receptors by using natural screening.

To ensure adherence with the LMP, prior to contractors attending site they are required to read and sign the Contractor Environmental Compliance Statement (CECS) which includes all limits and specifications as detailed in the LMP. In line with the CECS, all CDM

sites will be inspected monthly by the Environmental Department to monitor compliance. All non CDM sites may be inspected by the Environmental Department, dependant on the environmental risk of the work being carried out.

Additional monitoring and control of abnormal activities and contractor works within a CDM site is achieved through:

- Project Department PEEPO audits
- CECS reference within the Pre-Construction Information Plan
- Review of all Construction Phase Health and Safety Plans by the Environmental & Sustainability Manager or Advisor prior to the contractor attending site whenever practicable
- Involvement of the Environmental Department at relevant Project kick off meetings whenever practicable

In addition, all external surface lighting shall be periodically inspected by the Electrical Department during the surface external lighting inspection to ensure the correct aiming directions are maintained throughout the life of the installation.

If any equipment is found to be incorrectly aligned, modifications shall be made to ensure it is restored to 'as designed' and, if required, re-inspected. This monitoring procedure shall ensure that, during the time the site is occupied, the levels of lighting are maintained in accordance with current best practice and standards whilst ensuring the potential impact associated with the introduction of temporary lighting on identified receptors is controlled and minimised as far as practicably possible.

## **7. Monitoring**

A lighting audit will be carried out at least annually, or following a significant change on the site such as construction or demolition, to identify:

- the effectiveness of the LMP;
- the effectiveness of the site lighting controls;
- any redundant or unnecessary lighting units which can be permanently removed.

Lighting hazards e.g., impact to a light and so a change in the mounting position, noticeably bright or directional lights or broken lighting will be reported via GoArc by all staff.

A surface external lighting inspection is carried out every 90 days by the Electrical Department to identify to ensure compliance with the LMP, to include permanent and temporary lighting.

## **8. Boulby Community Forum**

The Boulby Community Forum (BCF) meets quarterly. The purpose of this BCF is threefold:

- to bring together a network of parties that have an interest in the site and its operations;

- to facilitate communication between these interested parties; and
- to provide a forum for this network to share information and discuss matters that arise.

The BCF shall be composed of representatives from the following groups/bodies:

- the Operator – Cleveland Potash Ltd (CPL);
- the local community – representative from the parish council;
- the local planning authority – NYMNP;
- the local county councillor;
- the Environment Agency;
- the local council Scientific Officer – Redcar and Cleveland Council.
- ICL employees (attendance dependant on topics to be discussed).
- Local residents and business owners

Attendees may vary depending on the availability of all invited and their delegates.

The BCF shall meet quarterly to discuss ongoing operations, proposed changes, community concerns and complaints. Where appropriate, lighting monitoring data may be provided to the BCF; this data is discussed below in more detail.

## **9. Complaints**

All complaints regarding lighting will be recorded and reported in line with PRO 05 (b) Environmental complaints.

In the event of a complaint from a member of the public regarding light emissions from the site, a record will be kept on the 'Complaints Log' and within the Enablon system. Details of corrective actions will also be recorded. This information will be made available to the NYMNP and Redcar and Cleveland Council as required.

## **10. Review and Update**

The continuing effectiveness of this LMP will be reviewed biannually in consultation with the NYMNP and Redcar and Cleveland Council. The reviews will take into account the compliance records, complaints history, monitoring records and any recent changes to local receptors.

Reviews of the plan will also be undertaken in the event of:

- Construction or demolition activities on site
- Identification of effectiveness failing in the LMP during the annual lighting audit
- Lighting complaints from nearby residents or businesses

Following an event as listed above, the plan will be amended as necessary, including any changes to the monitoring methods and control measures which may be agreed. Once complete (following internal review and approval), the plan will then be communicated with the NYMNP and Redcar and Cleveland Council as soon as practicable.

<b>Revision History</b>	<b>Prepared By</b>	<b>Authorised By</b>
Rev:0	Gemma Cannon	Lisa Marshall

<b>Involved Parties</b>		
<b>Name</b>	<b>Position</b>	<b>Comments</b>
Lisa Marshall	Head of SHEQ	Comments made
Andrew Haigh Turner	Compliance Manager	Comments made
Wayne Donoghue	Electrical Inspection & Testing Supervisor	Comments made
Grahame Wallace	Head of Engineering	Comments made
James Hall	Engineering Projects Manager	Comments made
Nick Cook	Senior Project Engineer	Comments made
Keith Welford	Facilities Manager	Comments made

## Authorisations

Position	Required (Y/N)	Name	Signature	Date
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Head of SHEQ	Y	Lisa Marshall		
Safety Manager	Y	Carl Baxter		
Environmental Manager	Y	Gemma Cannon		
Quality Manager	N			
Head of Operations (Mining and Infrastructure)	N			
Head of Operations (Processing)	Y	Gordon Frame		
Business Project Manager	N			
Head of Engineering	Y	Grahame Wallace		
Terminal Manager	N			
Head of Site Services and Business Communication	Y	Dave Mcluckie		
Facilities Manager	Y	Keith Welford		
Electrical Engineer	Y	Greig Cowell		
Mechanical Engineer				
Head of Technical Services	Y	Clive Mitchell		
Sales and Marketing Manager				
HR Manager				
Training Manager	Y	Andrew MacDonald		
Purchasing Manager				



NYMNP

22/11/2022

# SCHEME OF AIR QUALITY MONITORING AND CONTROL

BOULBY MINE

Prepared for: Cleveland Potash Limited

SLR Ref: 403.064404.00001  
Version No: v1.0  
September 2022

SLR 



## BASIS OF REPORT

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Appendix 1: Air Emissions Inventory	
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## 1.0 INTRODUCTION

SLR Consulting Limited (SLR) has been instructed to prepare an Air Quality Monitoring Plan to satisfy Condition 21 of a planning permission (North York Moors Ref: NYM/2019/0764/MEIA) on behalf of Cleveland Potash Ltd for the continued operation of Boulby Mine over the next 25 years. Condition 21 requires *'a scheme of ambient air quality monitoring and control for the Boulby Minehead operational site shall be submitted to the MPA for written approval in consultation with RCBC and SBC EHOs.'*

The aim of the air quality monitoring plan (MP) is to provide details of the monitoring program and reporting processes required to determine whether the Site is operating within the relevant air quality standards and permitted limits.

### 1.1 Background

The Site began mining potash in 1973 and subsequently developed to also mine salt for road and animal feed application. Since 2016 however focus shifted to mining polyhalite. Potash mining ceased in 2018. Polyhalite, sold as 'Polysulphate™' is a fertilizer providing sulphur, potassium, magnesium and calcium. CPL also blends the polyhalite with imported potash on site to create 'PotashpluS™'.

### 1.2 Scope

The scope of the monitoring is to quantify concentrations of airborne pollutants at the site during standard operations throughout the year. The MP is designed to measure and assess various air emissions during operations in order to identify any exceedances of the air quality standards and criteria.

Monitoring will focus on the following air emissions:

- Deposited dust, directional dust and surface soiling;
- Particulate matter – PM<sub>10</sub>, PM<sub>2.5</sub>, and PM<sub>1</sub> fractions;
- Nitrogen dioxide (NO<sub>2</sub>);
- Total Volatile Organic Compounds (VOCs) and Benzene; and
- Metals analysis.

## 2.0 SITE SETTING

### 2.1 Site Setting

The Site is located within Boulby in North York Moors National Park Authority's administrative area, approximately 1.5km from Staithes village and centred at the approximate National Grid Reference (NGR): x476200, y518200. The Site is bounded by:

- the A174 to the immediate north, followed by residential properties and farmland, beyond which lies the North Sea;
- Roxby Woods Ancient Woodland immediately to the east with residential properties and Staithes village further afield;
- a continuation of Roxby Woods located immediately to the south alongside the Site railroad out and various existing residential properties further afield; and
- rural land to the immediate west, beyond which are existing residential properties.

### 2.2 Site Layout

Figure 2-1 illustrates the Site layout and any process areas which have the potential to generate significant quantities of fugitive emissions.

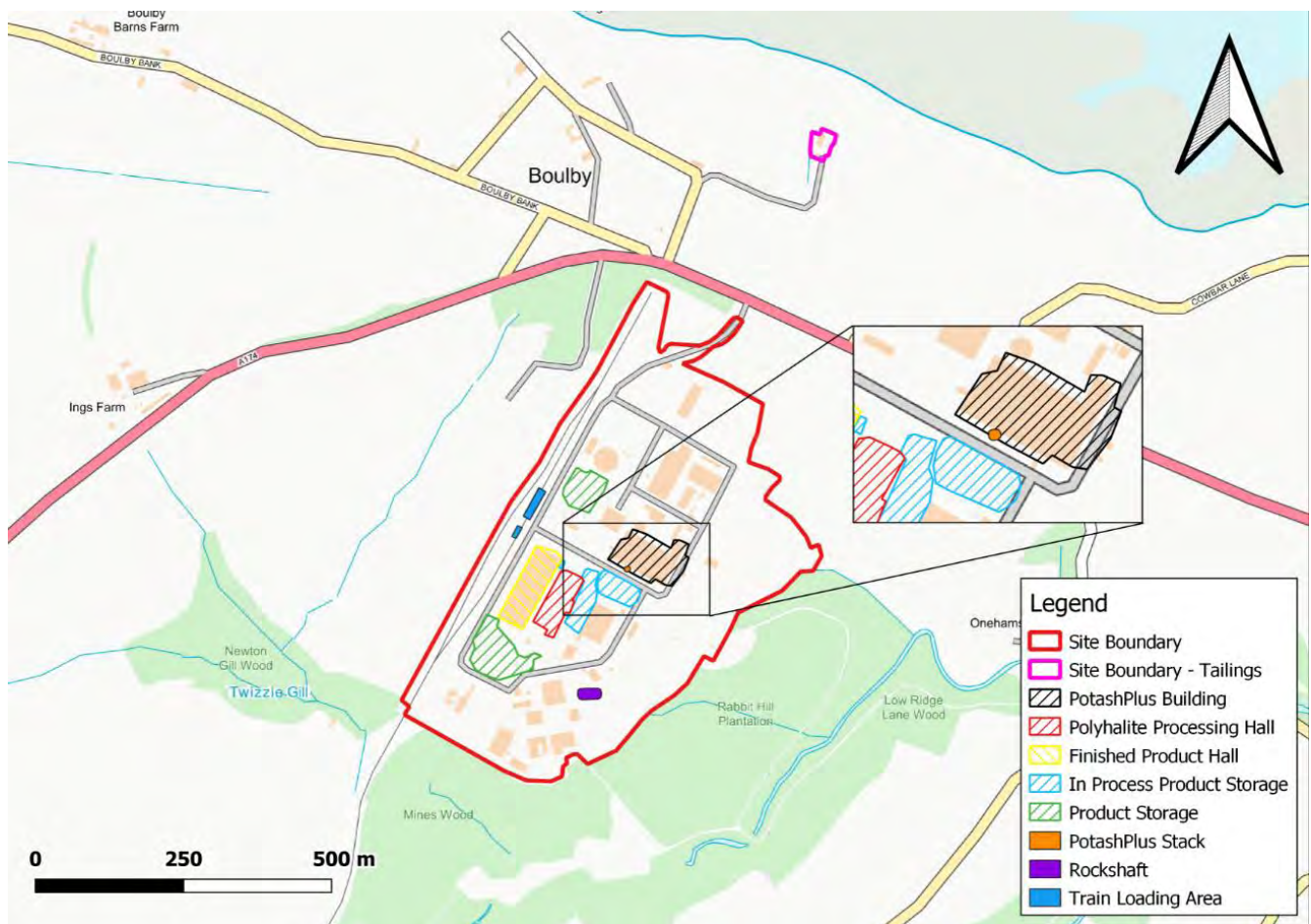


Figure 2-1  
Site Layout and Process Features

## 2.3 Receptors

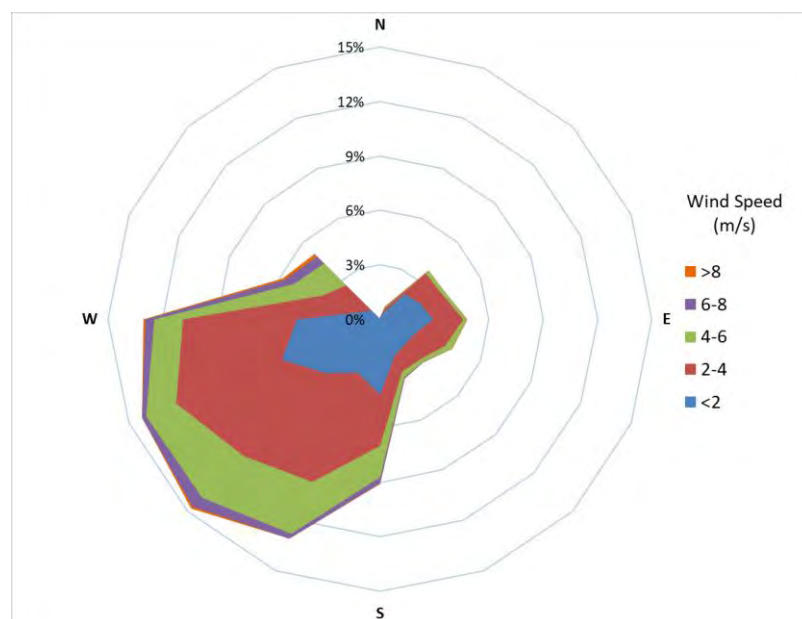
Various dust receptors have been identified within the mine’s area of influence. The sensitive receptors are listed in the ‘Environmental Improvement Plan’ spreadsheet referenced in the site Dust Management Plan (DMP). The nearest have been summarised in Table 2-1 below and illustrated in Figure 5-1. The receptors identified within this non-exhaustive list have been used to inform the dust monitoring plan.

**Table 2-1**  
**Nearby Sensitive Receptors**

Receptor	Receptor Type	Direction from Site	Distance to Site Boundary (m)
R1	Boulby Grange Holiday Cottages	Northwest	230
R2	Residential property off Boulby Bank	North	90
R3	Cleveland Way	North	260
R4	Redhouse Farm Holiday Cottage	Northeast	400
R5	Residential property off Ridge Lane	East	390
R6	Ridge Hall Holiday Cottages	Southeast	430
R7	Residential property off Ridge Lane	Southeast	430
R8	Residential property off Ridge Lane	Southeast	450
R9	Ings Farm	West	580

## 2.4 Meteorological Conditions

There are two meteorological stations on site, providing the most representative monitoring station. Wind speed and direction data for 28/05/2021 to 01/09/2022 is presented in Figure 2-2. It shows the prevailing wind to be from the west, southwest and south. As a result, the potential impact of emissions is likely to be greater to the north and east of the site. This informed the DMP and location of monitors in Section 5.0.



**Figure 2-2**  
**Onsite Meteorological Station 28/05/2021 to 01/09/2022 Wind Rose**

## 3.0 SITE OPERATION AIR EMISSION SOURCES

Different air emission sources have been identified within the site boundary and operational processes. The detailed sources are listed in the 'Environmental Improvement Plan' referenced in the Dust Management Plan, Section 2.6 *Receptors*. These sources are summarised in the following sections whilst a full overview list can be found in Appendix 1.

### 3.1 Material Handling and Stockpiling

Operations for the mine include various large-scale movements of Polyhalite, Potash and PotashpluS material through use of hoists, conveyors, chutes and wagons across the Site. As Polyhalite material is hoisted to the surface, through the Rock Shaft, dust is disturbed and carried via ambient winds across the Site.

The material is subsequently transported through conveyors and into processing buildings which can generate dust through agitation of the material. Unloading and loading of material through front loading shovels, wagons and chutes onto stockpiles and trains causes dust to disperse. Wind whipping of external stockpiled material can occur, leading to dust dispersion across the Site.

### 3.2 Site Roads, Rail Load Out and Vehicles

Vehicle movements on internal site roads can disturb dust that has previously settled on the road, and mobile plant and lorries driving across the Site exacerbate the effects of wind whipping on exposed material and increase dust agitation. Alongside this, dust material is collected on the tyres of visiting vehicles and tracked out off-site.

Furthermore, vehicles movements onsite and associated combustion emissions lead to emissions of NO<sub>2</sub> and VOCs in areas in which they operate.

During the Rail Load Out operations the trains are loaded via chutes before departing the Site. Once the trains have departed, enhanced wind whipping can occur due to the movement of the train along with meteorological conditions causing dust emissions to arise from the carriages.

### 3.3 Material Processing

Once material has been hoisted from the mine or imported through road transport links it goes through several processing stages within buildings on Site. Crushing and screening operations within the facility, by the nature of the process, can generate significant volumes of dust. Whilst the processing operations within these buildings are enclosed, various building entrances, shutters and doorways are opened for operational purposes. As a result, fugitive dust emissions from these process buildings can arise.

Furthermore, open exhaust vents atop some process building roofs allow for further fugitive emissions of dust.

### 3.4 Stack and Exhaust

During the processing of the PotashpluS product there is a requirement to dry the product in which a wet stack system is operated. In this process, dust and particulate matter is vented through the stack at a height of 87.5m.

As such, emissions of particulates to atmosphere occurs within the site and this is permitted to a limit of 50mg/m<sup>3</sup> through Redcar and Cleveland Permit Ref: RCBC/P00/14.

## 4.0 RELEVANT AIR QUALITY LIMITS

### 4.1 Air Quality Standards

The Air Quality Standards Regulations 2010<sup>1</sup> (AQSR) transpose both the EU Ambient Air Quality Directive (2008/50/EC)<sup>2</sup>, and the Fourth Daughter Directive (2004/107/EC)<sup>3</sup> within UK legislation, in order to align and bring together in one statutory instrument the Government’s obligations. The AQSR includes Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment.

#### 4.1.1 Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

Statutory limits exist for PM<sub>10</sub> and PM<sub>2.5</sub> concentrations under the AQSR and are displayed in Table 4-1 below.

**Table 4-1**  
**Ambient Air Quality Standards – Particulate Matter**

Pollutant	Limit Value	Measured As
Particles (PM <sub>10</sub> )	50 µg/m <sup>3</sup>	24-hour mean (not to be exceeded on more than 35 occasions per calendar year)
	50 mg/m <sup>3</sup>	Permitted stack emissions (as per RCBC/P00/14)
	40 µg/m <sup>3</sup>	Annual mean
Particles (PM <sub>2.5</sub> )	20 µg/m <sup>3</sup>	Annual mean

#### 4.1.2 Deposited Dust and Surface Soiling

Currently, there are no statutory limits for the assessment of deposited dust and its impacts. However, Environment Agency M17<sup>4</sup> guidance suggests a ‘custom and practice’ threshold of 200mg/m<sup>2</sup>/day where complaints may be likely and as a means of assessing site performance in the absence of any recognised limit values for visible deposited dust.

Furthermore, there are currently no statutory limits for surface soiling rates, but complaint thresholds<sup>5</sup>, as displayed in Table 4-2, are recommended and are widely adopted when assessing impacts of surface soiling on receptors.

**Table 4-2**  
**Surface Soiling Complaint Thresholds**

% Effective Area Covered (EAC) per day	Outcome
0.2	Noticeable
0.5	Possible Complaint

<sup>1</sup> The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.

<sup>2</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

<sup>3</sup> Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004.

<sup>4</sup> Environment Agency. Technical Guidance Note (Monitoring) M17. Monitoring Particulate Matter in Ambient Air around Waste Facilities. V2. July 2013.

<sup>5</sup> Bearman & Kingsbury, Assessment of Nuisance from Deposited Particulates Using a Simple and Inexpensive Measuring System, Clean Air, Vol.11.



% Effective Area Covered (EAC) per day	Outcome
0.7	Objectionable
2.0	Probable Complaint
5.0	Serious Complaint

#### 4.1.3 Nitrogen Dioxide (NO<sub>2</sub>)

Statutory limits exist for NO<sub>2</sub> concentrations under the AQSR and are displayed in Table 4-3 below.

**Table 4-3**  
**Ambient Air Quality Standards – Nitrogen Dioxide**

Pollutant	Limit Value (µg/m <sup>3</sup> )	Measured As
Nitrogen Dioxide (NO <sub>2</sub> )	40	Annual mean
	200	1-hour mean (not to be exceeded on more than 18 occasions per year)

#### 4.1.4 Total VOCs and Benzene

While there are no statutory limits for concentrations of Benzene in ambient air, limits exist in relation to workplace exposure as derived from Health and Safety Executive, EH40/2005 Workplace Exposure Limits (EH40).

**Table 4-4**  
**Workplace Exposure Limits – Benzene**

Pollutant	Limit Value (mg/m <sup>3</sup> )	Measured As
Benzene	3.25	8-hour Time Weighted Average

#### 4.1.5 Metals

While there are no statutory limits for concentrations of metals and metalloids in ambient air, there are a set of recommended guidelines developed in consultation with the Department for Environment, Food and Rural Affairs<sup>6</sup> (Defra). Initially a full metals suite analysis will be conducted to determine which, if any, metals arise on the site. Once metals have been identified, and if applicable, the following site concentration targets will be applied as displayed in Table 4-5.

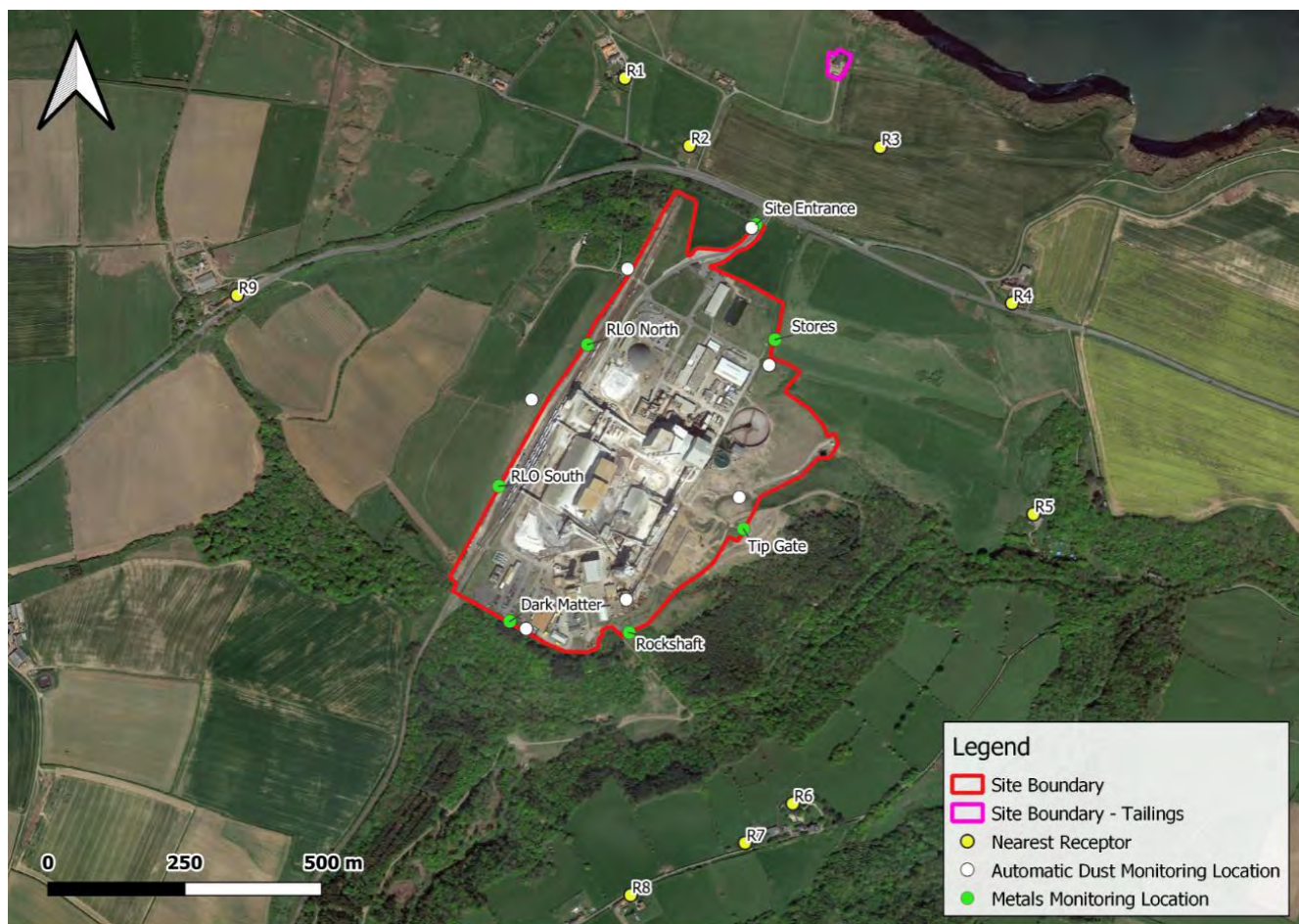
**Table 4-5**  
**Guidelines for Metals and Metalloids in Ambient Air**

Metal	Guideline Value	Measured As
Arsenic	3 ng/m <sup>3</sup>	Annual mean, as PM <sub>10</sub> fraction
Nickel	0.020 µg/m <sup>3</sup>	Annual mean, as PM <sub>10</sub> fraction
Beryllium	0.2 ng/m <sup>3</sup>	Annual average, PM <sub>10</sub> fraction
Chromium	0.2 ng/m <sup>3</sup>	Annual mean, as PM <sub>10</sub> fraction

<sup>6</sup> Defra. Consultation on guidelines for metals and metalloids in ambient air for the protection of human health. May 2008.

## 5.0 MONITORING METHOD

Various receptors sensitive to air emissions/pollutants have been identified within the mine’s Area of Influence, the nearest receptors are displayed in Figure 5-1. The receptors in Figure 5-1 and Table 2-1 along with the dominant meteorological conditions set out in Figure 2-2 have informed the methods and monitoring locations applied within this MP. The following sections describe each monitoring scheme to monitor concentrations of the parameters previously discussed.



**Figure 5-1**  
**Site Monitoring Locations and Nearest Receptors**

### 5.1 Particulate Point Source Emissions and Dust (PM10, PM2.5, PM1) Monitoring

An ISO 17025 accredited and Mcerts certified organisation will conduct the annual particulates emissions testing from the drier stack. The approved Environment Agency method to follow will be BS EN 13284-1 “*Determination of low range mass concentration of dust - Part 1: Manual gravimetric method*”.

Seven automatic air monitoring units will be deployed at perimeter locations around the site in order to obtain fugitive dust measurements during all wind directions. Proaxis Opcube air quality monitors will be installed, please refer to Section 4.2.3.1 *Continuous Real Time Dust Monitors* of the Dust Management Plan for information on data capture. The locations for the installation of automatic monitors are shown in Figure 5-1. The automatic air quality monitoring will be undertaken in real-time using continuous air quality monitors which allow simultaneous monitoring of PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub>.

The units use photometers to analyse individual particles as they pass through a laser beam, this technology can measure particulates of varying fractions, reporting mass concentrations of PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub>. The units log data and send it via a GSM connection to an online portal where the real-time data can be viewed via an online application which enables the user to view changes in concentrations throughout a defined time period.

As the Site is a 24/7 operation, this monitoring method enables the site management to closely assess concentrations of particulate matter arising throughout site operations.

Site limits are set for both PM<sub>10</sub> and PM<sub>2.5</sub> concentrations reflecting the air quality standards set out in Section 4.1.1. This will send alerts to site management when concentrations are above these standards and allows for a quick and immediate mitigation response. Refer to Section 4.2.4 *Response* of the Dust Management Plan.

Visual monitoring for dust emissions will be undertaken daily alongside routine site walkovers and will provide the site management with an overview of areas in which dust is being generated and where dust emissions could potentially lead to impacts or exceedances of the air quality limits. Refer to Section 4.2.3.3 *Visual Inspections* of the Dust Management Plan.

## 5.2 NO<sub>2</sub>, VOCs and Benzene

Passive sampling will target NO<sub>2</sub>, VOCs and Benzene concentrations. These parameters will be monitored at seven locations on a quarterly basis by using diffusion tubes. The tubes will be sited at the Metals Monitoring Locations as shown in Figure 5-1.

Diffusion tubes work through the process of molecular diffusion in which high concentrations of a substance in the air move to areas of lower concentration. Substances within the air are at a higher concentration than that inside the tube and therefore the substances diffuse into the tube and are absorbed at the end cap.

Diffusion tubes are suited to long term monitoring as over time a sufficient quantity of the pollutant is absorbed onto the tube.

The following tube setup and changeover protocol will be followed:

- Liaise with the laboratory for an order of new diffusion tubes;
- Upon receipt of the new tubes, they will be kept refrigerated until deployment;
- Tubes shall be installed at a height of 2m from ground level and with free-flowing air around the exposed end of the tube. Ideally tubes will be installed away from building facades and areas in which airflow is significantly obstructed and influenced by structures;
- Each tube location shall be marked with an identification number and logged, to ease collection of tubes and avoid sample submission errors;
- Once installed, the exposure cap should be removed from the tube and kept for use at the completion of the monitoring period;
- A travel blank tube should be escorted whilst installing the tubes and stored in refrigeration until collection of the exposed tubes; and
- After a period of 2 – 4 weeks the diffusion tubes will be collected, capped and sent to the laboratory for analysis along with the travel blank.

## 5.3 Metals

At the end of every quarter, dust deposition gauges will be installed at the Metals Monitoring Locations as shown in Figure 5-1, to collect fugitive dust to be analysed for metals by an ISO 17025 accredited laboratory.

For the first year, a full metals suite analysis will be undertaken to assess metal concentrations in the dust and to characterise the dust in an attempt to understand the source (mine, or general geological dust). Once any metals have been determined and the source verified, the monitoring plan approach to metals analysis will be reviewed and amended accordingly.

The sampling equipment will be placed at the sampling points identified on the monitoring location plan (Figure 5-1), unless site circumstances indicate that this would not enable a representative sample to be collected. Circumstances which might be encountered include; not enough quantity of sample collected, crops being grown around a proposed monitoring point or being harvested nearby, overhanging trees, a change in the site access road location, etc. If this occurs advice will be sought from the Environmental and Sustainability Manager as to whether re-locating the monitoring point would be appropriate or whether the monitoring equipment should be set up in the original location or the monitoring abandoned for that point. If it is decided to continue with the monitoring at that point, a note will be made to aid with interpretation of anomalous results.

## 5.4 Complaints Response

Upon receipt of a dust complaint the site management will aim to collect as much information as possible from the complainant including location, date, time, details of dust and any further information which will aid an assessment of the complaint.

Once details have been determined, further assessment shall be undertaken to substantiate the dust complaint through:

- Review the live PM<sub>10</sub> and PM<sub>2.5</sub> concentrations from the automatic monitors, if assessing a historic complaint utilise data previously captured;
- Review any dust mitigation measures in place during the time of the complaint;
- Review meteorological conditions (wind direction/wind speed/rainfall) from the onsite weather station during the complaint period to see if a pathway can be established between the site and complainant; and
- Review deposited dust and surface soiling results for the period in which the complaint was made.

If the complaint is received in a timely fashion from the event reported, reactive visual dust inspection of the site will be carried out by the site management. It should be noted that targeted visual inspection is only of use soon after the event reported as conditions (both meteorological and/or operational) rapidly change. If required to substantiate a dust complaint, a visual inspection at the complaint location should be undertaken to verify authenticity of the complaint received.

Please refer to Section 6 – *Complaints* of the Dust Management Plan for details on the complaints logging procedure.

## 6.0 REPORTING

All laboratory analysis and monitoring results from the various methods will be collated and stored on file by site management and procedures for reporting should follow the relevant sections below.

### 6.1 Particulate Matter (PM<sub>10</sub>, PM<sub>2.5</sub> & PM<sub>1</sub>)

Particulate matter alerts will be set according to the limits set out in Section 4.1.1, this will alert the site management to any exceedances of PM<sub>10</sub> and PM<sub>2.5</sub> limits. A limit for PM<sub>1</sub> has not been regulated yet. The analysers deployed will be PRAXIS/OPCUBE Air Quality Monitors. Please refer to the Dust Management Plan Section 4.2.3.1. *Continuous Real Time Dust Monitors*.

When an alert is triggered, the following steps will be undertaken as soon as practicable:

- Log the time in which the alert occurred;
- Note all meteorological observations and recorded information from the onsite weather station;
- Record all onsite activities and operations underway during the alert period;
- Monitor concentrations reported by the automatic units and if they do not fall take onsite action to reduce dust emissions; and
- After 24 hours, the mean will be calculated and if in exceedance of the air quality limit it shall be logged as an incident on Enablon.

Please refer to Section 4.2.4 – *Response* of the Dust Management Plan for the detailed alarm response procedure.

### 6.2 Fugitive Emissions of Metal Compounds

Deposited metal dust results for each gauge will be received from the laboratory undertaking the analysis and collated in order to assess potential fugitive emissions of metal compounds. Initially the monitoring will only look at whether there is presence of metals in airborne dust. This requirement will be reassessed once quarterly results throughout the first year have been collated.

### 6.3 NO<sub>2</sub>, VOCs and Benzene

Passive sampling results for NO<sub>2</sub>, VOCs and Benzene will be reported by the laboratory, and these shall be logged in a database format until sufficient monitoring has been conducted to assess concentrations against air quality standards. If the standards have been exceeded, site management will undertake investigation and actions to reduce concentrations of the relevant substance on site.

### 6.4 Mitigation

Good site practice and the compliance with mitigation measures set up within the Dust Management Plan should be executed at all times on the site. Site management will continuously assess the effectiveness of mitigation measures in line with the results of the monitoring campaigns and where appropriate reinforce mitigation to reduce concentrations of any relevant exceedances of the air quality standards as set out in this monitoring scheme. Please refer to Sections 3.1. and 3.2. *Good Practice Mitigation* of the Dust Management Plan.

## APPENDIX 1

### Air Emissions Inventory

Potential Dust Source	Associated Site Activities	Details	Operational Profile
Internal Site Roads	Dumper Trucks and other site vehicles moving about site.	Vehicle Movements on internal operational roads disturbs dust on the road. The roads are not tarmacked.	24-hour operation - When vehicles are active.
Product/Material being carried by Dumper Trucks	Dumper Trucks moving material about site.	Wind whipping (exacerbated by truck movement) on exposed material releases dust.	When dumper trucks are active.
Storage Piles/Deposited material	Exposed storage piles (final product, imported potash, out of spec material, waste material) and dust on all surfaces.	Wind whipping on storage piles/deposited dust releases dust to atmosphere.	24-hour exposure.
Unloading from Dumper Trucks	Material unloaded from Dumper Trucks onto piles.	Dumper Trucks unload material onto ground outside exposed locations (e.g. a pile directly outside the Potash Plus building)	When dumper trucks are active.
Train Bay Filling	Trains bays filled - material dropped from conveyor.	Dust escape from bay and whilst being dropped from conveyor	When Trains are being filled.
Dust settled on Trains	Trains in transit from site.	Trains fill bays on site and transport product to Teeside dock. Material deposited on trains (and tracks) is disturbed by the train movement and releases dust onto area surrounding tracks.	When Trains leave site
Dust settled on Lorries	Lorries in transit from site	Lorries filled on site and transport offsite. Material deposited on lorries and picked up by wheels is released onto surrounding road and area.	When lorries leave site
Conveyors	Conveyor movement of material. Dropping of material off conveyor onto pile.	Conveyors to southern side of site connecting to rockshaft are not fully covered. Conveyors dropping material onto 'off-spec' product pile.	When conveyors in operation transporting material.

Potential Dust Source	Associated Site Activities	Details	Operational Profile
Movement of material within Buildings	Material moved by machinery and plant (including front end loaders).	Material moved by machinery and plant (including front end loaders) inside building disturbs and releases dust	24-hour operation.
Rockshaft Mine Shaft - Hoisting of Material	Material hoisted from mine below to surface.	Dust disturbance at surface by hoisting of material from deep	Evening and through night.
Screening	Screening of material within process buildings.	Agitating of material leading to dust generation and dispersion	24-hour operation
Crushing	Crushing of material within process buildings	The crushing of product leads to dust creation and dispersion	24-hour operation

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## Odour Monitoring and Control Scheme

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<b>PURPOSE</b>	<p>To provide clear, concise and consistent methods for the monitoring and control of odour emissions arising from the site.</p> <p>To demonstrate compliance with statutory requirements.</p>
<b>SCOPE</b>	All aspects of Surface and Mining Operations at Boulby
<b>DEFINITIONS</b>	<p><b>OMCS</b> – Odour Monitoring and Control Scheme  <b>Enablon</b> – Incident and Near Miss Reporting Software  <b>GoArc</b> – Hazard Reporting Software  <b>BCF</b> – Boulby Community Forum  <b>CPL</b> – Cleveland Potash Ltd  <b>RCC</b> - Redcar and Cleveland Council  <b>BMP</b> - Best Practicable Means  <b>EP Regulations</b> - Environmental Permitting Regulations  <b>EA</b> – Environment Agency  <b>ESM</b> – Environmental and Sustainability Manager  <b>ESA</b> – Environmental and Sustainability Advisor  <b>SHEQ</b> – Safety, Health, Environment, Quality  <b>NYMNP</b> - North York Moors National Park  <b>SLT</b> – Senior Leadership Team  <b>IAQM</b> – Institute of Air Quality Management  <b>EMS</b> – Environmental Management System</p>
<b>RESPONSIBILITIES</b>	<p><b>The Environmental and Sustainability Manager (ESM)</b> will ensure that the OMCS is reviewed annually or following any significant changes. The ESM will ensure that odour incidents and complaints are reported on the Enablon System. The ESM will report all relevant information to the SLT.</p> <p><b>The Environmental and Sustainability Advisor</b> is responsible for the management of the odour surveys and analysis of the trends.</p> <p><b>Shift Manager (Processing)</b> is responsible for the investigation of any odour hazards or incidents and ongoing adherence to the odour management controls.</p> <p><b>Compliance Manager</b> is responsible for arranging audits to monitor compliance of the management plan</p> <p><b>Analytical Technicians</b> are responsible for carrying out an odour check daily</p> <p><b>All staff</b> are responsible for reporting odour incidents via Enablon or odour hazards via GoArc.</p> <p><b>Senior Leadership Team (SLT)</b> are responsible for reviewing the odour data and setting objectives to mitigate any negative trends, with improvements being assigned.</p>

<p><b>LEGISLATION AND OTHER REFERENCES</b></p>	<ul style="list-style-type: none"> <li>• Redcar and Cleveland RCBC/P001/14 permit</li> <li>• Environmental Permitting (England and Wales) Regulations (2016)</li> <li>• Section 79 of Part III of the Environmental Protection Act (1990)</li> <li>• The Integrated Pollution Prevention and Control (IPPC) Directive</li> <li>• Environment Agency, H4 Odour Management, How to comply with your environmental permit, March 2011.</li> <li>• Verein Deutscher Ingenieure (VDI), 2006, "Measurement of Odour Impact by Field Inspection - VDI 3940".</li> <li>• Environment Agency (EA), "Frequently asked questions, Landfill Sites, updated 30 January 2020.</li> <li>• Verein Deutscher Ingenieure (VDI), 1994, "Olfactometry Determination of Hedonic Odour Tone - VDI 3882 Part 2".</li> <li>• IAQM, Guidance on the assessment of odour for planning, July 2018.</li> <li>• 403.064404.00001_Boulby Mine_Odour Survey_v1.0</li> <li>• BS EN 13275:2022 – Determination of odour concentration by dynamic olfactometry and odour emission rate.</li> <li>• EOP 1 Dust Management Plan</li> <li>• NYMNP Planning Permission NYM_2019_0764_MEIA Condition 23</li> <li>• PRO 05 (b) Environmental complaints</li> <li>• Nuisance Activities and Sources Spreadsheet</li> </ul>
<p><b>TRAINING REQUIREMENTS</b></p>	<p>Annual Environmental Permit Awareness training for all staff via LMS</p>

# 1. Introduction

## 1.1. Overview

Odour monitoring and control is a requirement of the Planning Permission NYM\_2019\_0764\_MEIA, Condition 23, as detailed below.

*“Within three months of the commencement of the development a scheme of odour monitoring and control shall be submitted to the MPA for written approval in consultation with RCBC and SBC EHOs.*

*Such scheme shall identify the procedures to be adopted to monitor emission of odours from the Boulby Minehead operational site and the routine and contingency odour mitigation measures to be employed during site operations.*

*An updated odour monitoring and control scheme shall be submitted for approval by 30 June 2028 to reflect changes to site conditions and operations following completion of the Phased partial deconstruction works and otherwise every two years to reflect other changes in site conditions, operations and activities taking place on site and evolving good practice in odour mitigation.*

*Management of odour shall take place in accordance with such details as may be approved under the terms of this condition.*

**Reason:**

*In the interests of amenity and to accord with the provisions of NYM Local Plan Policy ENV7.”*

## 1.2. Purpose

The purpose of this Odour Monitoring and Control Scheme (OMCS) is to outline the monitoring and control procedures for the control of odour emissions associated with the operation of Cleveland Potash Ltd (CPL), to ensure that odours do not negatively impact on surrounding receptor.

## 1.3. Background

The site began mining potash in 1973 and subsequently developed to also mine salt for road and animal feed application. Since 2016 however focus shifted to mining polyhalite. Potash mining ceased in 2018. Polyhalite, sold as ‘Polysulphate™’ is a fertilizer providing sulphur, potassium, magnesium and calcium. CPL also blends the polyhalite with imported potash on site to create ‘PotashpluS™’.

The site operates up to 24 hours a day. The material is hoisted to the surface via the Rock Shaft through the evenings and night-time. The mined material is processed on site and the product is exported by either train or wagon.

## 1.4. Permit

The site mineral processing activities are operated under a Redcar and Cleveland Council (RCC) EPR Part B permit; reference RCBC/P001/14. The Permit only relates to mineral processing activities and therefore only covers the ICL Potashplus™ stack and fugitive emissions, but not mining emissions.

There is not specific reference to odour and therefore the following condition applies:

*“1.2 The best available techniques shall be used to prevent, or where this is not practicable, reduce emissions from the installation / mobile plant, in relation to any aspect of the operation of the installation / mobile plant which is not regulated by any other condition of this permit.”*

Further, Section 3 of the permit outlines conditions applicable to monitoring, sampling and measurement of emissions at the site, as follows:

*“3.2 Adverse results from any monitoring activity (both continuous and non-continuous) shall be investigated by the operator as soon as the monitoring data has been obtained. The operator shall:*

- *Identify the cause and take corrective action;*
- *Clearly record as much detail as possible regarding the cause and extent of the problem, and the remedial action taken.*

*3.3 In the case of abnormal emissions, malfunction or breakdown leading to abnormal emissions the operator shall:*

- *Investigate and undertake remedial action immediately;*
- *Adjust the process or activity to minimise those emission.*

*3.4 The regulator shall be informed without delay, whether or not there is related monitoring showing an adverse result:*

- *If there is an emission that is likely to have an effect on the local community;*  
*or*
- *In the event of the failure of key arrestment plan, e.g., scrubber units.”*

An odour assessment has been undertaken (SLR reference: 403.064404.00001\_Boulby Mine\_Odour Surveys\_v1.0) to inform the Odour Monitoring Scheme.

## 1.5. Odour Nuisance Regulation

The main requirements with respect to odour control from premises that are not permitted under the Environmental Permitting (England and Wales) Regulations (2016), and subsequent amendments, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

*“any dust steam, smell or other effluvia arising on industrial trade or business premises and being prejudicial to health or a nuisance.”*

Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department (Redcar and Cleveland Council (RCC)), whose officers are deemed to provide an independent evaluation of nuisance. If the Local Authority is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an abatement notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no malodour beyond the boundary of the works. A defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to Best Practicable Means (BPM).

## 2. Policy and Guidance

### 3.1. H4 Odour Management

The Environmental Permitting Regulations (the “EP Regulations”) require the control of pollution including odour. The Integrated Pollution Prevention and Control (IPPC) Directive includes odour in the definition of pollution and requires that “[...] *all the appropriate preventive measures are taken against pollution [...]*”. The operator must employ the appropriate measures necessary to prevent odour pollution or minimise it when prevention is not practicable.

The Environment Agency’s (EA) H4 Odour Management<sup>1</sup> guidance is designed to help permit holders achieve compliance with regard to odour. Whilst not specifically mentioned in the site Permit, Condition 1.2 as outlined in Section 2.4 requires control of ‘emissions’. While the permit serves the processing of materials on the surface, the need for control of ‘emissions’ has also been applied to gases from the mining process as best practice.

The H4 Odour Guidance has therefore been used to inform the monitoring scheme in order to best identify odour ‘emissions’ to inform when/where application of Best Available Technique (BAT) is required.

### 3.2. Assessment of Odour

The ‘intensity’ of an odour is determined using the intensity scale presented in VDI 3940<sup>2</sup>, transposed within the H4 guidance and presented in *Table 2-1*. A ‘description’ for each odour intensity level is provided by the EA<sup>3</sup>.

*Table 2-1: Odour Intensity Scale*

Level	Odour Intensity	EA description
0	Not Perceptible	No odour
1	Very Weak	Need to inhale into the wind to smell anything
2	Weak	You can detect an odour when you inhale normally
3	Distinct	There is clearly an odour in the air as you leave your car or enter the area
4	Strong	A bearable odour but strong, you could stay in the area for some time
5	Very Strong	Unpleasantly strong, you will want to leave the area quickly
6	Extremely Strong	Likely to cause nausea and a strong need to remove yourself from the odour immediately

The ‘offensiveness’ of the odour is determined using a hedonic tone measurement scale taken from VDI 3882 Part 2<sup>4</sup> as presented in *Table 2-2*.

<sup>1</sup> Environment Agency, H4 Odour Management, How to comply with your environmental permit, March 2011.

<sup>2</sup> Verein Deutscher Ingenieure (VDI), 2006, “Measurement of Odour Impact by Field Inspection - VDI 3940”.

<sup>3</sup> Environment Agency (EA), “Frequently asked questions, Landfill Sites, updated 30 January 2020.

<sup>4</sup> Verein Deutscher Ingenieure (VDI), 1994, “Olfactometry Determination of Hedonic Odour Tone - VDI 3882 Part 2”.

Table 2-2: Odour Hedonic Tone Scale

Level	Hedonic Tone
+4	Extremely pleasant
+3	Very pleasant
+2	Pleasant
+1	Weakly pleasant
0	Neutral
-1	Weakly unpleasant
-2	Unpleasant
-3	Very unpleasant
-4	Extremely unpleasant

The ‘pervasiveness / extent’ of the odour at the test location is assessed by calculating the ‘percentage odour time’, which is the number of samples where odours are recognisable, divided by the total number of samples (i.e., 30). The average odour intensity [ $I_{\text{mean}}$ ], over the test period is calculated and the maximum intensity observed is noted.

The Institute of Air Quality Management (IAQM) provides guidance for the assessment of odours for planning<sup>5</sup>. Whilst this guidance is not intended to provide guidance on odour for environmental protection regulatory purposes, it provides a description of receptor sensitivity types which are summarised in Table 2-3.

Table 2-3: IAQM Receptor Sensitivity

Receptor Sensitivity	Example Land-uses
High	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• users can reasonably expect enjoyment of a high level of amenity; and</li> <li>• people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include residential dwellings, hospitals, schools/education and tourist/cultural</p>
Medium	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• users would expect to enjoy a reasonable level of amenity, but wouldn’t reasonably expect to enjoy the same level of amenity as in their home; or</li> <li>• people wouldn’t reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include places of work, commercial/retail premises and playing/recreation fields.</p>
Low	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• the enjoyment of amenity would not reasonably be expected; or</li> </ul>

<sup>5</sup> IAQM, Guidance on the assessment of odour for planning, July 2018.



Receptor Sensitivity	Example Land-uses
	<ul style="list-style-type: none"> <li>there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</li> </ul> Examples may include industrial use, farms, footpaths and roads

### 3. Baseline Environment

#### 3.1. Site Setting

##### 3.1.1. Site Location

The site is located to the south of the A174 within Boulby, approximately 1.5km west of Staithes at approximate National Grid Reference (NGR): x476200, y518200. The area immediately surrounding the site consists of fields, farmland and woodland, however there are a number of isolated residential and holiday cottage properties in proximity to the site. The closest existing property is located less than 90m to the north of the site, along A174 and Boulby Bank.

Reference should be made to *Figure 3-1* for an illustration of the site location.

##### 3.1.2. Receptor List

There are a number of isolated sensitive receptors in proximity to the site. The closest sensitive receptors in each direction surrounding the site have been identified and presented in Table 3-1. There may be more receptors at a greater distance, however when considering that odour concentration decreases with the distance from the source, it can reasonably be inferred those receptors at a greater distance would not be adversely affected if receptors in closer proximity are not predicted to experience an adverse effect. The receptor sensitivity has been determined in reference to the IAQM guidance, in which residential dwellings are determined to be of a 'high' sensitivity to odours and footpaths determined to be of 'low' sensitivity.

*Table 3-1: Nearby Sensitive Receptors*

Receptor	Receptor Type	Direction from Site	Distance to Site Boundary (m)	Sensitivity to Odour
R1	Boulby Grange Holiday Cottages	Northwest	230	High
R2	Residential property off Boulby Bank	North	90	High
R3	Cleveland Way	North	260	High
R4	Redhouse Farm Holiday Cottage	Northeast	400	High
R5	Residential property off Ridge Lane	East	390	High

Receptor	Receptor Type	Direction from Site	Distance to Site Boundary (m)	Sensitivity to Odour
R6	Ridge Hall Holiday Cottages	Southeast	430	High
R7	Residential property off Ridge Lane	Southeast	430	High
R8	Residential property off Ridge Lane	Southeast	450	High
R9	Ings Farm	West	580	High

Reference should be made to *Figure 3-1* for an illustration of the sensitive receptors relative to the Proposed Development.



*Figure 3-1: Site Location and Nearby Sensitive Receptors*

Receptors, their sensitivity, and location are documented on the ‘Nuisance Activities and Sources’ spreadsheet and reviewed at least quarterly at the Environmental Nuisance Management Steering Group, annually at the EMS Management Review and following a nuisance incident (dust, noise or lighting) by the Head of Operations (Processing) and the Environmental and Sustainability Manager. A log of changes will be maintained on the document.

### 3.1.3. Meteorological Data

There are two meteorological stations on site, providing the most representative monitoring station. Wind speed and direction data for 28/05/2021 to 01/09/2022 is presented in *Figure 3-2*. It shows the prevailing wind to be from the west, southwest and south. As a result, the potential impact of emissions is likely to be greater to the north and east of the site. The wind speeds are relatively calm which would result in decreased dispersion and dilution of odour.

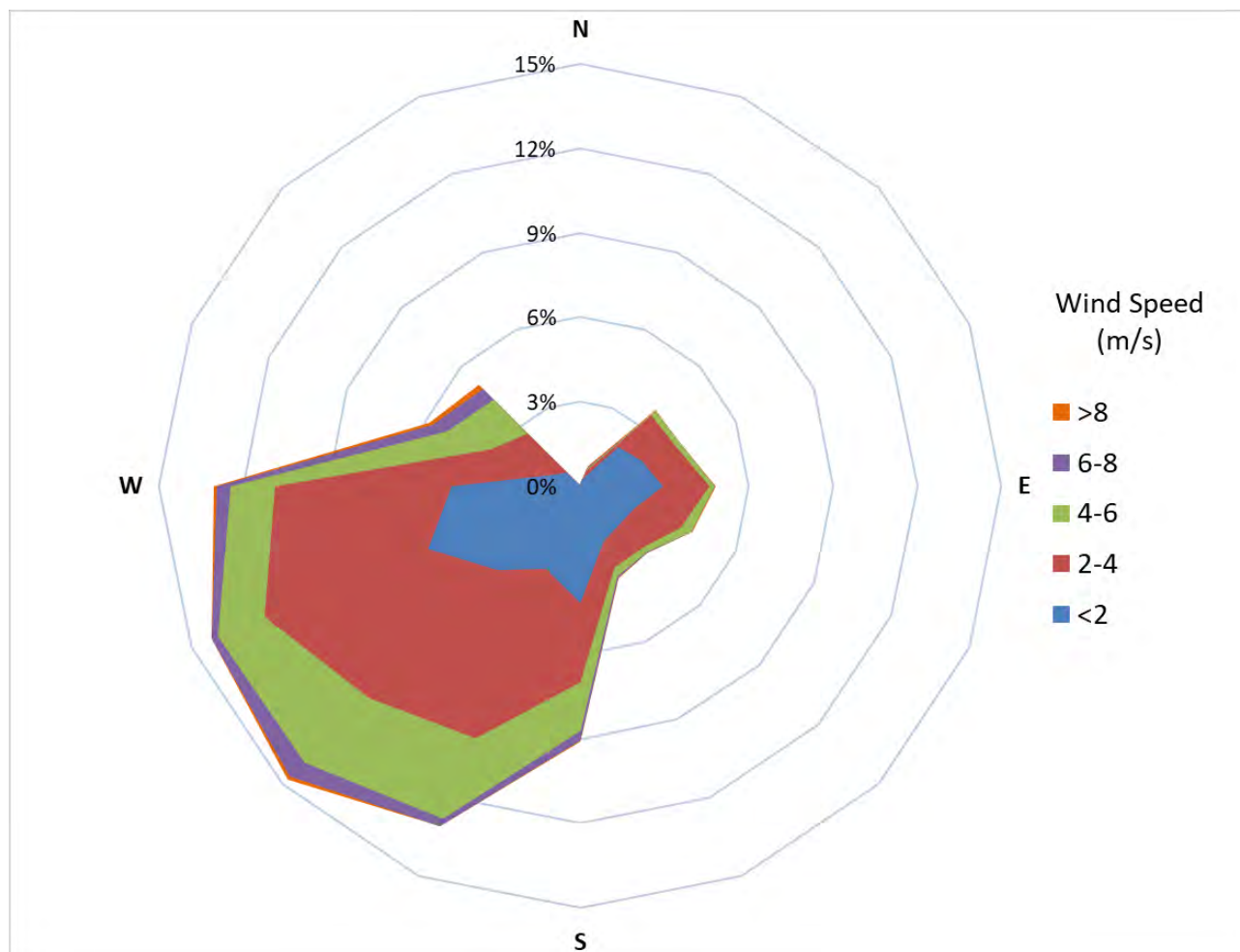


Figure 3-2: Onsite Meteorological Station 28/05/2021 to 01/09/2022 Wind Rose

## 3.2. Established Baseline

### 3.2.1. Potential Sources of Odour

A review of odour sources on site has been undertaken following a full odour assessment (SLR reference: 403.064404.00001\_Boulby Mine\_Odour Survey\_v1.0) and site reconnaissance<sup>6</sup> to characterise baseline odour conditions. The following potential odour sources have been identified:

<sup>6</sup> SLR Consultant attended the Boulby site on 22/07/2022.

## **Rock Shaft Gas**

The mining operations at the site have intersected an unknown fault, resulting in gas releases upwards through cracks, which then escapes through the Rock Shaft to atmosphere. This gas is not a feature of the normal mining cycle. It is a continuous fugitive release irrespective of ongoing site operations. The gas composition has been tested by CPL which identified traces of mercaptans, organic compounds with a distinct odour (garbage, cabbage and rotten garlic character). The odour field assessment concluded that the Rock Shaft Gas odour had potential to create 'serious odour pollution' downwind from Rock Shaft at nearby sensitive receptors, given the unpleasant, persistent and potentially strong nature of the odour associated with the mercaptans present in the fugitive emissions. The presence of gas and associated odour is anticipated to decrease with time. Further, it has been noted by site staff that the mercaptans character has been decreasing since the start of the gas release episode. The rate of release of gas is not consistent and has reduced significantly since the initial release, and is now below detectable levels (as of September 2022).

## **ICL PotashpluS™ Building and/or Stack**

A distinctive 'burning wax' (slight chemical, musty and waxy odour), slightly sweet odour character was perceived downwind of the ICL PotashpluS™ Building.

A large stack serves the ICL PotashpluS™ processing building to emit exhaust from driers which heat a mix of SMOP (standard muriate of potash) & Poly fines. The Finished sized product is fed to a waxing drum and coated with a wax which seals the Granule to prevent dust from being created on the final product. Wax is supplied from the European Union and stored in external sealed tanks at 80 degrees. A simple pump feeds the wax via heated pipeline to a nozzle within the coating drum (which is sealed). The material is then conveyed to the rail wagons for despatch.

Complaints between 2020 and 2021 detailed a rubbery burning and burning wax smell. These were attributed to grounding from the ICL PotashpluS™ stack.

However, given the process as described the wax is introduced to the product after the drier combustion process and therefore associated odours should not be entering the stack outlet air. It is therefore concluded the observed waxy odour may originate from the ICL PotashpluS™ building or the associated stack.

The odour field assessment concluded that while the burning wax odour can potentially be observed downwind from the ICL PotashpluS™ building and stack at nearby sensitive receptors it has very weak average intensity and becomes transient and weaker with distance from the stack. Therefore, it was not considered to cause 'serious odour pollution' off site.

## **Material and Dust Across Site**

There is dust present on the site from a number of sources as detailed in the Dust Management Plan. This dust has a musty, mineral type character and is a continuous fugitive release given the site is operational 24 hours a day. The odour field assessment concluded that the musty, mineral smell was very weak and while it could be observed at the perimeter, it was not typically observed with increased distance from the site at identified receptors and was not considered to cause 'serious odour pollution' off site.

## **Seawater/Brine**

Seawater/Brine is used to scrub the dust within the wet scrubber systems serving the ICL PotashpluS™ stack emissions and is dewatered from the mine, and then returned to the sea via tailings. The seawater is stored in the reservoir prior to use in the plant, following which it is discharged directly to sea via the effluent line. The seawater odour was only observed during one of the sniff assessments indicating it may be linked to specific Site operations and weather conditions. The odour has a salty, seawater character. The odour field assessment concluded that the salty, seawater smell was very weak and while it could be observed at the perimeter on one day of assessment, it was not observed with increased distance from the site at identified receptors and was not considered to cause 'serious odour pollution' off site.

## **General Waste and Food Waste Skips**

General waste and food waste is generated on site and stored in skips before regular removal offsite (approximately once per week). No associated odours were detected during the site reconnaissance trip or during the odour surveys, however the skips have the potential to generate odour dependant on the contents. The odour was not observed during the odour field assessment and therefore was not considered to cause 'serious odour pollution' off site.

## **Sewage Enclosure Tank**

Site sewage is processed through a small tank enclosure. A '1/6' intensity wastewater odour was detected in close vicinity to the tank during the site reconnaissance, but no odour was detected during the odour surveys. The odour was not observed during the odour field assessment and therefore was not considered to cause 'serious odour pollution' off site.

# **4. Odour Monitoring Plan**

## **4.1. Pro-Active Odour Monitoring**

### **4.1.1. Odour Sniff Testing**

Monitoring of ambient odours at the site and surrounding area provides a broad indication of site odours and the effectiveness of the odour management measures as a whole (i.e., odour minimisation and containment). This is an ongoing process and allows for live assessment of process odours.

Meteorological data from the onsite recording station will be utilised to determine local weather conditions. Meteorological data is a useful tool for investigating off-site odours observed, odour complaints or to verify community observations.

## **Fortnightly**

Routine off-site 'sniff testing' odour surveys are to be undertaken at the sensitive receptor locations on a fortnightly basis. The monitoring frequency may be increased or decreased to reflect the perceived odour sensitivity at the site, as directed by the Environmental and Sustainability Manager (ESM), Environmental and Sustainability Advisor (ESA) or the Head of Safety, Health, Environment and Quality (SHEQ). All staff are required to report unusual, new and/or changes to odours on site via the hazard reporting software, GoArc.

The odour surveys will be undertaken as follows:

- This monitoring will be carried out by certified members of staff (ESM/ESA) that has gone through an odour acuity assessment at a certified laboratory;
- Monitoring is undertaken at the sensitive receptor locations as shown in Table 3-1;
- Where an odour is perceived to be present, assessments will be undertaken over a 5-minute period with appraisal of odour every 10 seconds;
- Perceived odours will be scored using the intensity scale, assigning a numerical value between 0 (no odour) and 6 (extremely strong odour) as per Table 2-1;
- The perceived frequency, duration, offensiveness and character will also be noted as outlined within the H4 odour guidance and Section **Error! Reference source not found.**; and
- Weather conditions, including meteorological data from the onsite recording station, will be recorded for each survey.

Any odour issues identified during the sniff testing will be recorded on SAP.

### **Daily**

Daily odour checks will be undertaken as follows:

- Once per day an odour check will be undertaken during the Meter Round;
- Where an odour is perceived to be present, the source of the odour will be attempted to be traced and identified;
- If odours are identified with potential intensity >'3/6' (distinct), then assessments will be carried out as per the fortnightly assessment, across a 5-minute period with appraisal of odour every 10 seconds; and
- All odours causing a hazard (risk of nuisance or external complaint) will be logged on GoArc.

Any odour issues with the potential to cause offsite nuisance identified during the sniff testing will be reported to the certified members of staff (ESM/ESA) who will undertake an additional odour survey at the sensitive receptor locations.

#### **4.1.2. Rock Shaft Gas Monitoring**

Periodic analysis of gas samples from the Rock Shaft gas will be undertaken and logged by the ventilation engineer when odorous gas is being released. The frequency of analysis will be based on the situation that presents itself at the time.

If the Rock Shaft gas source depletes and no longer presents an odorous source, the periodic monitoring will cease.

## **4.2 Reactive Odour Monitoring**

### **4.2.1 Following Odour Sniff Testing**

Following detection of any off-site odours during the pro-active monitoring surveys (which can be attributed to the site operations) of an intensity of '3' or greater, a hazard will be raised on GoArc by the ESM/ESA and a further on-site inspection will be carried out seeking to trace the source of the perceived odour to ascertain whether it is attributable to site activities. The ESM (or Head of SHEQ) would be informed so that the appropriate corrective and/or preventative action can be taken.

Further sniff testing would be undertaken around the area in which the odour was identified to understand the extent of the off-site odours. Sniff testing would also be undertaken at potentially affected receptors listed in Table 3-1 (i.e., a receptor is downwind of the identified odour source, and it is deemed sufficiently odorous at the site boundary).

If it is determined that the perceived odour is not attributable to site activities, the assessor will attempt to trace back the odour plume to identify and record the third-party odour source.

#### **4.2.2 Following Received Odour Complaint**

Upon receipt of an odour complaint, the ESM, ESA or Head of SHEQ will be informed as soon as possible, recording the key information (i.e., location, time and date of the complaint) in line with PRO 05 (b) Environmental Complaints.

The appropriate area responsible person will subsequently undertake further assessment to substantiate the odour complaint through:

- Review of operator logs relating to the period in question;
- Review of the operations at the site prior to and at the time of the complaint;
- Review of the environmental control systems operating prior to and at the time of the complaint;
- Review of the meteorological conditions (wind speed/wind direction/rainfall/atmospheric pressure) from the onsite meteorological station prior to and at the time of the complaint, to establish whether a pathway can be established between the site and the complainant; and
- Review of the previous complaint history at the location identified.

If the complaint is received in a timely fashion from the event reported, reactive sniff testing would be carried out by the ESM/ESA at the complainant location to assist the substantiation process. It should be noted that sniff testing is only of use soon after or during the event reported as conditions (both meteorological and/or operational) rapidly change. In recognising that odour can be transient and short-lived, timely notification of odour complaints directly from the complainant or the responsible authority is imperative to allow for appropriate investigation. However due to delays in reporting it may not be possible to fully investigate or substantiate the complaint.

Where odour is substantiated, the key 'FIDOR' criteria will be considered to assess the potential odour effect on the receptor in accordance with the EA H4 Odour guidance:

1. The *frequency* is a measure of how often to which an individual is exposed to a specific odour. Individuals are more likely to tolerate a more pleasant / inoffensive should they only occur infrequently. Odours are more likely to be considered a nuisance if the exposure increases in frequency;
2. The *intensity*, or perceived strength, of an odour is directly linked to the likelihood of complaint, with a distinct odour at a higher intensity more likely to give rise to specific complaints;
3. The *duration* of exposure to an odour – complaints are more likely to occur if an individual is subject to a specific odour over a longer period of time;

4. The *offensiveness*, also termed 'hedonic tone', is a subjective measure of how pleasant or unpleasant an odour is deemed to be; and
5. The *receptor sensitivity* of an odour is a consideration of both the land-use surrounding an odorous source, and the sensitivity of surrounding receptors. For example, in a rural context those odours associated with agriculture / farming would be considered more acceptable at sensitive residential locations due to the accepted and typical nature of the odour. The converse would be expected in an urban setting.

The FIDOR factors determine whether an odour can be perceived as a nuisance. However, the approach recognises that multiple FIDOR factors need to be considered before an odour can be considered to be a statutory nuisance – the longer the odour detection persists for an individual, the greater the level of complaints may be expected, particularly if the odours are unpleasant.

#### **4.2.3 Following Abnormal Meteorological Conditions**

Additional sniff testing will also be undertaken where periods of adverse meteorological conditions (i.e., hot, still days with winds blowing towards nearby receptors), breakdowns or during other abnormal events to evaluate the effectiveness of the control measures in place and the likelihood that odour complaints could be received.

#### **4.2.4 Impartial Monitoring Company Sniff Testing**

If required, an impartial monitoring company would be commissioned to undertake sniff testing. This would occur where:

- Complaints of offensive odour are received which are believed to originate at the site but cannot be identified;
- Complaints of offensive odour are received which are believed to originate at the site but cannot be substantiated;
- An influx of complaints is received (>10 in a month) and the odour source cannot be isolated to a one-off site processing event.

### **5. Remedial Actions**

Odour incidents may be determined at the site as follows:

- Receipt of an odour complaint that is clearly attributable to the facility
- Detection of significant / offensive odour beyond the site boundary during routine odour surveys that relates specifically to site operations; and/or
- Damage to, or failure of, on-site odour containment infrastructure (i.e., building integrity).

If any of the above odour incidents are determined at the site, the following remedial actions shall be undertaken by the ESM (or ES admin):

- The ESM or Head of SHEQ will co-ordinate with the Senior Leadership Team (SLT) (internally) as well as the local planning authority (North York Moors National Park - NYMNP) and RCC Scientific Officer (externally);



- If not previously undertaken, the responsible area person will undertake a site investigation in order to determine the likely cause(s) of the off-site odour reported; and
- The site investigation will incorporate assessment of the site infrastructure and process conditions, to determine any diversion away from 'normal' site operating conditions.

The key items for consideration would be:

- Material inputs / outputs – change in material type, volume, odour characteristics;
- Building integrity, housekeeping, door control;
- Failure of external utility supply site water, electricity;
- Procedural failure (human error);
- Short-term abnormal weather patterns such as wind direction or temperature inversions (i.e., dawn/dusk); and
- Abnormal operating conditions or temporary odorous activities.

Upon identification of a likely odour source(s), the appropriate corrective and preventative measures will be identified and if possible, implemented under the direction of the ESM, ESA or Head of SHEQ. Additional support and technical expertise would be sourced from internal or external technical specialists as required.

If it proves impracticable to carry out adequate remedial measures within one working day, ESM, ESA or Head of SHEQ will notify and agree with the NYMNP and RCC the proposed actions and the timescales for their completion as a programme of works.

## **6. Odour Control**

There are no specific odour BAT Reference Documents (BREF) applicable to the underground mining process or surface material processes. Good site practice and management is undertaken to minimise site odours. Specific identified potential source odour controls are listed below.

### **6.1 Specific Source Control**

#### **6.1.1. Rock Shaft Gas**

No related controls are presently in place. The odours are not typical of the normal mining cycle and were caused by the mining operations intersecting an unknown fault. Plans to introduce controls are in development.

#### **6.1.2. ICL PotashpluS™ Building and Stack**

##### **Building**

Visual checks and inspection of joints and seals will be carried out of the waxing/coating drums and sealed external tanks. Olfactory checks will be undertaken regularly by site staff in the process area to identify any potential odorous wax gas escape. If any leaks are discovered by these processes, they will be reported via the hazard reporting software, GoArc and fixed accordingly.

## **Stack**

Treatment of the product with wax occurs post combustion circuit which should avoid the hot wax gas entering this airstream.

Two Osprey wet scrubber systems are in place to reduce particulates from the stack emissions. Annual stack testing is carried out by a third party to monitor the particulates and ensure they remain below the emission limit value outlined in the permit (RCBC/P001/14). There is also annual maintenance including a safety critical inspection of the stack integrity.

Additional odour concentration measurements will be taken annually in order to assess the efficiency of the scrubbers in removing odours. This will be conducted following the sampling method described on BS EN 13275:2022 – Determination of odour concentration by dynamic olfactometry and odour emission rate.

### **6.1.3. Material and Dust Across Site**

Details on control of material and dust can be found in EOP 1 Dust Management Plan.

### **6.1.4. Seawater/Brine**

There are no controls in place to regulate the seawater/brine odour. However, based on the odour surveys undertaken this was not found to cause offensive odour offsite and as such, odour controls are not required.

### **6.1.5. General Waste and Food Waste Skips**

The skips are removed from site approximately once a week. Based on the odour surveys undertaken this was providing suitable control and odours could not be detected offsite.

### **6.1.6. Sewage Enclosure Tank**

The sewage tank is covered and enclosed. Based on the odour surveys undertaken this was providing suitable control and odours could not be detected offsite.

## **7. Boulby Community Forum**

The Boulby Community Forum (BCF) meets quarterly. The purpose of this BCF is threefold:

- to bring together a network of parties that have an interest in the site and its operations;
- to facilitate communication between these interested parties; and
- to provide a forum for this network to share information and discuss matters that arise.

The BCF shall be composed of representatives from the following groups/bodies:

- the Operator – Cleveland Potash Ltd (CPL);
- the local community – representative from the parish council;
- the local planning authority – NYMNP;

- the local county councillor;
- the Environment Agency;
- the local council Scientific Officer – Redcar and Cleveland Council.
- ICL employees (attendance dependant on topics to be discussed).
- Local residents and business owners

Attendees may vary depending on the availability of all invited and their delegates.

The BCF shall meet quarterly to discuss ongoing operations, proposed changes, community concerns and complaints. Where appropriate, odour monitoring data may be provided to the BCF; this data is discussed below in more detail.

## **8. Complaints**

All complaints regarding odour will be recorded and reported in line with PRO 05 (b) Environmental complaints.

In the event of a complaint from a member of the public regarding odour emissions from the site, a record will be kept on the 'Complaints Log' and within the Enablon system. Details of corrective actions will also be recorded. This information will be made available to the NYMNP, and Redcar and Cleveland Council as required.

## **9. Review and Update**

The continuing effectiveness of this OMCS will be reviewed biannually in consultation with the NYMNP and Redcar and Cleveland Council. The reviews will take into account the compliance records, complaints history, monitoring records and any recent changes to local receptors.

Reviews of the plan will also be undertaken in the event of odour complaints from nearby residents or businesses

The plan will be amended as necessary, including any changes to the monitoring methods and control measures which may be agreed.

An updated OMCS shall be submitted to the NYMNP for approval by 30 June 2028 to reflect changes to site conditions and operations following completion of the Phased partial deconstruction works.

# Appendix A

## Odour Assessment Form

Background Information			
Person Undertaking Survey (& Position)			
Date:		Time:	
Description of Wind Strength (i.e. strong, gusty)			
Wind Direction			
Weather description (i.e. sunny, overcast)			
Temperature (°C)			
Survey Results			
Location	Intensity (1-6) (see below)	Persistence (A-E) (see below)	Odour Character (i.e. natural gas odour)
R1			
R2			
R3			
R4			
R5			
R6			
R7			
R8			
R9			
If odour is strong / persistent additional information to be detailed below			
Intensity			
1	No detectable odour		
2	Faint odour (barely noticeable)		
3	Moderate odour (odour easily detected)		
4	Strong odour (bearable but offensive)		
5	Very strong odour (instinct to walk away)		
6	Extremely strong odour highly likely to cause annoyance (May induce nausea)		
Persistence			
A	Occasional	Less than 10% of the time	
B	Intermittent	10-30% of the time	
C	Frequent	30-50% of the time	
D	Persistent	50-75% of the time	
E	Constant	>75% of the time	
Further Actions			
If during the survey the odour is strong or persistent at any location on the site boundary, the following information requires completion regarding plant operation.			
Containment	Has any loss of containment occurred on site?		
	If yes, what procedures are being followed?		

<b>Revision History</b>	<b>Prepared By</b>	<b>Authorised By</b>
Rev:0	Gemma Cannon	Lisa Marshall

<b>Involved Parties</b>		
<b>Name</b>	<b>Position</b>	<b>Comments</b>
Lisa Marshall	Head of SHEQ	Comments made
SLR Consulting		Documented drafted
Gemma Cannon	Environmental & Sustainability Manager	Draft transferred to CPL template
Andrew Haigh Turner	Compliance Manager	Comments made

<b>Authorisations</b>				
<b>Position</b>	<b>Required (Y/N)</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
General Manager	<b>Y</b>	Malcolm Mewett		
Head of SHEQ	<b>Y</b>	Lisa Marshall		
Safety Manager	<b>Y</b>	Carl Baxter		
Environmental Manager	<b>Y</b>	Gemma Cannon		
Quality Manager	<b>N</b>			
Head of Operations (Mining and Infrastructure)	<b>Y</b>	Richard Severn		
Head of Operations (Processing)	<b>Y</b>	Gordon Frame		
Business Project Manager	<b>N</b>			
Head of Engineering	<b>Y</b>	Grahame Wallace		
Terminal Manager	<b>N</b>			
Head of Site Services and Business Communication	<b>Y</b>	Dave Mcluckie		
Facilities Manager	<b>N</b>			
Electrical Engineer	<b>N</b>			
Mechanical Engineer	<b>N</b>			
Head of Technical Services	<b>Y</b>	Clive Mitchell		
Sales and Marketing Manager	<b>N</b>			
HR Manager	<b>N</b>			
Training Manager	<b>Y</b>	Andrew MacDonald		
Purchasing Manager	<b>N</b>			