



Appendix 3A

Restoration Concept

NYMNPA

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CLEVELAND POTASH LTD, BOULBY MINE

Restoration Proposals

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1. Introduction

Boulby Mine lies midway between Easington and Staithes within the Borough of Redcar and Cleveland on the North Sea coastline. The site is located within the North York Moors National Park and operates under planning permission NYMR/003/0043B/PA (with an accompanying Section 106 Agreement dated 8 April 1998) as granted by the North York Moors National Park Authority (NPA). The permission is due to expire on 6 May 2023, with Condition 5 requiring the site to be restored in accordance with details to be agreed under Condition 6 by 6 May 2025.

Condition 6, requires:

Within two years of the date of this permission a detailed scheme for the restoration of the whole surface of the mine site shall be submitted to the National Park Authority for its written approval. The scheme shall make provision for the removal from the surface of the mine site of all buildings, plant, machinery, roadways and surfaced areas, the regrading of the site to specified contours and the restoration and after-care of the whole site. The scheme shall provide for such steps as may be necessary to bring the restored site to a condition suitable for agriculture and nature conservation after-use including the planting of woodland and hedgerows. Thereafter the site shall be restored in accordance with the approved details or in accordance with such other details as may be approved in writing by the National Park Authority.

Condition 12 requires details of 'ongoing landscaping and screening implementation works' to be submitted to the NPA for written approval.

The extent of the site that is covered by the above permission is shown on Figure 2274.1.

This report sets out landscape restoration proposals which have been prepared to meet the requirements of Condition 6.

Outline details of proposed landscape screening works, which form advanced parts of the overall site restoration measures, are included in this report. These will be supplemented in due course with full details (eg planting plans) to be submitted to the NPA under separate cover. Outline details of overall implementation methods are provided in this report.

This report has been prepared by Estell Warren Ltd, acting as sub-consultants to Royal Haskoning DHV on behalf of Cleveland Potash Ltd (CPL), operators of the mine.

2. Existing Site

The existing site is considered in two parts (as shown on Figure 2274.1):

- The operational mine area, including surface buildings, processing plant, winding towers, access roads, parking etc extending to 31.8ha
- Land surrounding the operational mine, within the ownership of CPL and extending to a further 90.6ha directly around the operational mine and 16.4ha north east of the A174 near Red House Farm.

In total operational and non-operational areas occupy a landtake of 138.8ha.

Although the planning permission only applies to the operational mine area a holistic approach has been taken with landscape proposals being prepared for areas within the complete CPL land holding.

The mineral railway extends beyond the site boundary to Saltburn but is not included in this exercise.

Operational Mine

The mine is sited on the south side of Rockcliff Hill on a development plateau that lies at elevations mainly between 89-82m AOD and falls gently south eastwards towards the valley of Easington Beck. A screening embankment has been constructed along the north western edge of the site, to a maximum elevation of approximately 108m AOD. Within the surrounding landscape topography rises to 192m AOD at Rockcliff Hill in the north, falls gently south eastwards along the cliff tops north of the site near Red House Farm and falls steeply from the southern operational mine boundary to the floor of Easington Beck at around 30m AOD.

Springs at the foot of Rockcliff Hill feed minor watercourses which drain from north west to south east in culverts below the operational mine site. The northernmost outfall drains to Boulby Gill, the central outfall drains to an unnamed watercourse and the southern culvert directs the Twizzie Gill watercourse under the mine railway, just outside the southern tip of the operational mine area. All watercourses drain to Easington Beck, which lies to the south east of the operational mine and drains in a north easterly direction.

Road access to the mine is directly off the A174 to the north east. The bulk of mine buildings, including chimney stacks, winding towers, processing plant, storage areas, support accommodation and parking are set back from the road frontage and occupy the main body of the site. A railhead occupies the entire north western edge of the site, enclosed by the parallel screening embankment, which lies immediately outside the operational mine boundary. The operational mine site is enclosed by a chainlink and barbed wire security fence along its entire perimeter.

Within the operational area little scope exists for establishing permanent landscape works, due to the intensive use of the mine head area and the need to leave flexibility for accommodation of future development. The exception to this general rule includes areas of steeper ground falling away from the general development plateau down to Easington Beck along the central south eastern boundary and fields on the eastern edge of the site.

The remains of earlier development including the site of Boulby Hall, surface features associated with the Boulby Ironstone Mine and the former Saltburn and Whitby Branch railway have been removed within the footprint of the operational mine.

It is understood that original soils from the mine site have been stripped and placed in the large screening mound to the north west of the railhead. The quantity and condition of stored soils is not known at this stage.

Planning permission has recently been granted for amendments to the site access road and gatehouse area, these have been taken into account during preparation of restoration proposals.

The mine is embarking upon a development programme, which is expected to result in a combination of replacement and new structures within the footprint of the current operational mine area. The full details of these changes are not known at this time. Providing such features remain within the existing operational footprint, as is expected to be the case, they do not need to be taken into account in the proposed restoration scheme. Should future development extend beyond the current operational site, however, it may require amendment of the restoration proposals.

Non-operational Areas

Figures 2274.18, 19 and 20 show photographs of existing features and general character within non-operational areas of the site.

The extensive non-operational areas surrounding the mine head provide a landscape setting for the existing development. These areas show key characteristics of the distinctive local landscape character including a heavily incised landform and extensive large tracts of mature woodland growing within the shelter of valleys to the south and east of the mine. This is contrasted by tracts of open farmland with degraded field boundaries to the north and north west of the mine.

The wider site area is bounded by the A174 along the northern boundary from Ings Farm in the west to Red House Farm in the east. The southern boundary follows the edge of mature woodland on the southern side of Easington Beck valley before crossing the valley, through mature woodland, and returning north west to the A174 along the edge of mature woodland within Twissie Gill and Newton Gill. The southern boundary adjoins pastoral farmland, with small to medium size fields enclosed by hedgerows. The western boundary abuts arable farmland, with larger field sizes and relict hedgerow enclosure.

Separate to the main land ownership, on the north eastern side of the A174, the company also owns a tract of arable farmland located between the A174 and the cliff tops west of Redhouse Nab. This area is characterised by a lack of field boundaries and exposed cliff top setting.

To the north west of the mine topography falls from 155m AOD at the A174 to approximately 100m AOD along the northern toe of the screening mound before rising to 108m AOD along the crest of the mound. The southern face of the mound falls sharply to approximately 89m AOD along the railhead, before falling gradually across the minehead to 82m AOD. Beyond the minehead topography falls sharply again down the northern flank of Easington Beck valley before reaching the valley floor at approximately 30m AOD. Land to the north east of the A174 lies at an elevation between approximately 80-70m AOD, falling gently to the south east.

The site encompasses watercourses along Newton Gill and Twissie Gill in the west, Boulby Gill in the east and Easington Beck in the south, with a further, unnamed, watercourse lying on the northern flank of Easington Beck valley. Natural springs are a characteristic of the local area as noted on older maps, in particular, reference to 'Three Crosses Well' in fields to the north west of the mine. A drain is noted running from north east to south west along the northern toe of the screening embankment, before joining Newtown Gill. A reservoir, associated with the former Boulby Ironstone Mine, remains at the south western edge of the screening embankment.

The large tract of mature woodland running along the western and southern edges of the site includes Newton Gill Wood, Mines Wood, parts of Easington Woods and Low Ridge Lane Wood and Rabbit Hill Plantation. In general, the woodland comprises a mixture of broadleaved native species and planted coniferous woodland, with a variety of age structure, open areas, earth banks, shale cliffs and wet flushes. The woods contain a diverse and interesting ground flora including species-rich areas on former ironstone spoil heaps.¹ Ground flora indicates that parts of the woodland originate from ancient woodland. Dominant tree species include sycamore, ash and ... (input from RHDHV phase 1 survey needed).

¹ Report on a Botanical Survey of Boulby Mine Wood (Including Newton Gill Wood), Kenneth Trewren, August 2004

Nature conservation initiatives have been undertaken in the woodlands and the area is used for educational and nature trail purposes.²

Land in the north west area of the site comprises farmland mainly in arable use with gappy and eroded hedgerow boundaries. A wide stream (assumed to be fed by springs at the foot of Rockliff Hill) separates arable fields from the screening mound, which is laid to pasture. An area of dense stunted woodland and scrub lies at the northern tip of the site, adjacent to the A174, in the location of the former Boulby Ironstone Mine surface operations. The Boulby Mine Clay Pigeon Shooting Club is located within this woodland.

Land at the north eastern edge of the site, between the mine and A174, is in pastoral use, interspersed with fields that have been planted previously for visual screening purposes. Screen planting to the north west of the site access road is reasonably well established but contains incongruous conifer species. Screen planting in fields to the south east of the site entrance (referred to as 'Red House Field') is poorly established and incongruous, with tracts of an unknown, orange-stemmed willow cultivar remaining but little or no evidence of native trees and shrub species which should be present.³

Public access is possible into southern and western areas of the site, outside the operational mine footprint, with public footpaths running along Easington Beck valley and up Twissie Gill/ Newtown Gill to the A174 opposite Ings Farm. Footpath 504 (Easington) is currently subject to a minor diversion order but will continue to form a link northwards from the Easington Beck footpath system to the A174 near the mine entrance. The Cleveland Way National Trail runs from west to east along the cliff tops through the separate area of site which lies north of the A174 near Redhouse Nab. A further footpath links the Cleveland Way to the A174 near Boulby Grange. Footpaths within the site are well connected to the wider public right of way network along the Easington Beck valley to the south, across Rockliff Hill/ Boulby Hill to the north and along the coast to the east.

Surface remains and earthworks of the former Grinkle Ironstone Mine and associated incline up to the Saltburn and Whitby railway can be found in the Easington Beck valley. A former reservoir, associated with the Boulby Ironstone Mine, remains at the western edge of the operational mine site. Site history is discussed further below.

3. Site Context and Local Conditions

Please refer to Figures 2274.2 – 2274.8.

Landscape Character (including topography, vegetation cover and land use)

The site is located at the northern edge of the North York Moors National Park, approximately 400m south of the North Sea coastline between Staithes and Easington. Local landscape character is identified as being 'Coast and Coastal Hinterland, 4a Boulby – Whitby'⁴. Key landscape characteristics for this area comprise:

- Undulating or rolling coast and coastal hinterland underlain by sandstones and mudstones. Deposits of boulder clay on lower lying land gives rise to intensively farmed areas;
- Elevated areas allow long distant views across the area and out to sea;

² INCA information needed

³ 1:2500 scale plan labeled 'Boulby Potash Mine', Tilhill Economic Forestry, 20 October 1998

⁴ NYMNP Landscape Character Assessment, December 2003

- Broad bays interspersed with rugged indented lines of high crumbling or slumping cliffs. The cliffs support features of considerable botanical interest and a variety of nesting seabirds. The cliffs are renowned for their geological and fossiliferous exposures. Quarries and mines within the cliffs add cultural interest. The coastal zone to the north of the A174 road is part of the North Yorkshire and Cleveland Heritage Coast and a Regionally Important Geological and Geomorphological Site (Core Policy C, NYMNP, Local Development Framework);
- Inland areas include mainly arable farmland, interspersed with pasture and forestry plantations;
- Steeply incised and winding minor becks flow towards the coast. Becks frequently occur in pairs, following close and parallel courses;
- Beck valleys are often densely wooded and contrast sharply with the openness of the farmed landscape;
- Farmland is predominantly arable, interspersed with pasture and occasional plantations. Field patterns are regular, divided by a mixture of fences or closely trimmed hedgerows that are often thin, gappy and windblown with very occasional trees; creating a bleak and open appearance. Field boundaries have been removed entirely in certain areas. Around certain settlements a pattern of historic strip fields remain. There are small patches of scrub, bracken and upland heath;
- The busy A174 road traverses the landscape, often on ridgelines and very open locations where it has a significant effect on the area. A network of B roads link settlements; minor roads often include very steep gradients;
- The tall chimneys and structures of Boulby Potash Mine, the deepest mine in Britain, dominate the northern part of the character area.

The above characteristics are clearly represented in the local landscape surrounding and including the mine site.

Views

Estell Warren Ltd undertook a landscape appraisal⁵ to determine key views of the site from surrounding local areas:

- Elevated, panoramic views overlooking the entire operational mine from sections of the A174 at Boulby Bank to the north west of site, with the mine being seen against the sweeping backdrop of the Cowbar Nab headland;
- Panoramic, open views from the section of the A174 between Cowbar Farm and Boulby Bank, with the operational mine being seen against the rising backdrop of Rockcliff Hill;
- Panoramic, open views from public rights of way (including the Cleveland Way National Trail) crossing the open cliff top areas between Cowbar and Boulby to the north and north east of site, with the mine being seen partially against rising ground and open skyline;

⁵ Boulby Mine, Landscape Appraisal, Estell Warren Ltd, December 2012

- Occasional level views over intervening wooded valleys from Ridge Lane to the south west of site, with upper sections of mine buildings rising above woodland cover. Foreground hedgerows and mature tree cover filters most views and obscures views to lower level mine buildings and floorscape;
- Close range, open views of the mine, including ground level features and clutter, are possible from public footpaths running along Boulby Gill in the east and Newton Gill in the west. Local footpaths in Easington Beck valley are contained within mature woodland cover, with most views towards the site being heavily filtered or completely screened;
- Other rights of way in the local area near Red House Farm in the north east, Twizziegill Farm in the west and across the southern flank of Rockliff Hill in the north provide open views towards the site. Mine buildings are clearly visible in these views but ground level clutter tends to be obscured or too remote to have an adverse effect on view character.

Public Right of Way Network

The site lies within an extensive public rights of way network including south west to north east trending routes along both Easington Beck and Roxby Beck valleys in the south, connecting to routes across Rockliff Hill in the north and the Cleveland Way National Trail running along the cliff tops to the north and north east.

Microclimate

The site lies close to the North Sea on a stretch of coastline which is fully exposed to salt laden winds, including north easterly gales. All areas of the site should be considered subject to a harsh maritime climate, although this is likely to be further exaggerated across the open cliff top section of the site that lies north of the A174. Plant species choice should therefore reflect local microclimatic conditions and existing established vegetation in the area.

Areas of the site lying within the natural shelter of upper sections of Boulby Gill may present better opportunities for woodland growth.

4. Site History

The site lies within an area that is characterised by a rich history of mining and working of the local geology. Commentary below is mostly based on the following publications:

- Boulby Ironstone Mine, Chapman S., Industrial Archaeology of Cleveland, 1997;
- Grinkle Ironstone Mine, Part 1, Chapman S., Industrial Archaeology of Cleveland, 2012;
- Grinkle Ironstone Mine, Part 2, Chapman S., Industrial Archaeology of Cleveland, 2012.

Alum quarrying and processing at the Loftus Alum Works on Boulby Cliff, to the north of the site, began in the 1650's and finished in the 1860's. The remains of this industry are now managed by the National Trust.

Ironstone seams are exposed in cliffs and beaches from Saltburn to Scarborough, providing a source of ore through beach collection in the early days of the local ironstone industry. The

industry first expanded after a thick seam of ironstone was exposed during construction of the Whitby to Pickering railway. This was followed by a search for more accessible deposits resulting in commencement of mining at Skinningrove in 1848 on the Cleveland Main Seam, which outcrops locally in the cliffs at Boulby.

Pre-industrial Landscape

Please refer to Figures 2274.9 and 2274.10.

1846 – 1863 mapping shows the local landscape before large scale ironstone mining activity started. Boulby Hall and its associated access track are present (see further below). A strong woodland pattern, clearly following the shelter created by steep incised valleys, is evident together with a strong post-Enclosure field pattern, of small to medium size fields.

Grinkle Mine

The mine was established by Charles Mark Palmer, to feed the self-sufficient family iron and shipbuilding works at Jarrow. Initially the Palmers mined and shipped ironstone from Port Mulgrave, on the coast, some 3km east of the site, before opening the Grinkle Ironstone Mine in 1875. The Grinkle Mine entered the Cleveland Main Seam via a drift from the northern flank of Easington Beck valley, near the junction of Twizzie Gill and Easington Beck.

Workings within the Cleveland Main Seam extended south to the present day line of the potash mine mineral railway, north to the line of the A174 and north and westwards under the centre of Rockliff Hill, within the Easington Royalty. Easington Beck was diverted into a bypass tunnel and culvert (a structure which remains today) to create space at the mine entrance. Ore was transported to Dalehouse via a 3ft gauge tramway after which it passed underground through the Seaton Drift to Port Mulgrave before shipping to the Jarrow works.

In 1916, during World War One, shipping from Port Mulgrave was stopped and replaced by rail transport via the Saltburn to Whitby branch line. New sidings were constructed opposite the Boulby Ironstone Mine sidings and an electric powered double track incline installed to haul ore wagons up to the 30m higher sidings level. An aerial ropeway transported waste shale to the coast where it was dumped on the foreshore.

The mine closed in 1921 before reopening in 1929 and then closing again in 1930. The Grinkle Park Mining Company went into receivership in 1933 before final closure and dismantling in 1936.

Surface remains associated with the Grinkle Mine have since deteriorated gradually. A collapse of the Easington Beck culvert and subsequent flooding removed part of the former shale mound and repair works, undertaken as part of Boulby (Potash) Mine operations, resulted in the shale mound being spread more evenly across the site, removing earlier surface features. Further surface remains including the sites of the mine offices, engine shed and parts of the mine workshops were covered over during earthworks undertaken in the mid 1980's. Extant remains of the mine include the old Sirocco fanhouse (near Twizzie Gill), occasional retaining walls, exposed shale banks and the concrete hopper associated with the shale aerial runway. Part of Easington Beck remains in culvert, which has collapsed again and is being repaired. The mine drift opening remains but is securely gated for safety purposes.

The proposed restoration scheme would seek to preserve any remaining features of the Grinkle Mine but consideration should be given to removal of the culvert structure and formation of an open channel, to prevent potential long term problems which could arise from culvert blocking or collapse.

Boulby Ironstone Mine

After several false starts, during the mid nineteenth century, the Skinningrove Iron Company established Boulby Ironstone Mine in 1903. Two drifts were driven into the Cleveland Main Seam just below Boulby Banks. Minehead buildings and processing areas, including new sidings, were established on the north side of the Saltburn to Whitby branch line near Twizzie Gill. The mine worked the Cleveland Main Seam to the west of Boulby Grange, under Rockliff Hill, as far as the earlier Grinkle Mine workings, within land owned by the Baker-Baker family who owned and ran the earlier alum workings.

At the eastern extremity of the leased area a powder magazine was built close to the cliff edge. The drift mouths connected back to the minehead area via an inclined tramway running up the hillside to Boulby Bank.

In 1906 'Tin City' was established to the north of the present A174 and just north of the site boundary. 38 semi-detached bungalows were constructed from corrugated iron sheeting on timber frames and concrete foundations. The mine managers lived in the earlier, stone building of Boulby Grange, at the north west end of 'Tin City'.

Following a general fall in Britain's world trade after WW1, and along with the closure of other ironstone mines in the district, Boulby Ironstone Mine also closed in 1921. After reopening in 1923 the mine again closed in 1925 before reopening in 1927, only to close again, permanently, after a further 6 months. The mine was officially abandoned on 2 July 1934.

Following closure of the mine, tenants of 'Tin City' were eventually rehoused and the buildings demolished.

The majority of surface features associated with Boulby Ironstone Mine were removed during construction of the modern potash mine but a concrete lined reservoir remains at the western end of the screening embankment. Earthworks remains associated with the former drift mouth, below Boulby Bank, remain but are now partially obscured by tree cover. Preserved outlines of the bases of six 'Tin City' cottages are believed to remain at the north west end of the settlement, near Boulby Grange. Remains of the powder magazine are evident on the cliff tops but lie well outside the site boundary.

Boulby Hall

Boulby Hall is shown as being present on OS mapping up to at least 1863, with demolition assumed to have occurred when the Grinkle Mines were developed. The site of the hall has since been removed as part of the potash mine development.

Saltburn to Whitby Railway

Construction of the 16 mile Saltburn to Whitby Branch of the North Eastern Railway started in 1871 and was completed in 1883. The line was closed in 1958 and dismantled, before reinstatement of the section west of the site, to the Carlin How railhead, as part of the Boulby Potash Mine development.

Boulby Potash Mine

Post WW2 drilling identified beds of potash and salt lying at depth in the East Cleveland area. Following various proposals in the 1960's the Boulby site was selected and construction work began in 1969, with potash production commencing in 1973.

The potash beds lie between 1.2km to 1.5km below ground and are accessed via two 1100m deep shafts, with roadways and workings extending down to 1400m below ground level, making Boulby the deepest mine in the UK and second deepest in western Europe. The shafts are capped by a pair of unique cylindrical concrete headgear structures, one of which (the rock shaft, used for winding potash and salt to the surface) is currently being replaced on a like for like basis.

The mine is a significant producer of potash, delivering all the UK's domestic potash requirement and exporting around 50% of output. Rock salt is also produced in substantial quantities, as a by-product. Current annual production is in the order of 2.8 million tonnes of potash and 0.75 million tonnes of rock salt. Finished product is taken by train, along the former Saltburn to Whitby branch line, to Tees Dock for shipping to other UK ports and export markets abroad.

The mine workings extend below former ironstone workings and out under the North Sea, covering some 96 square kilometres at present.

The depth of the mine has made it suitable for use in researching dark matter, with the University of Sheffield operating a laboratory at the base of the shaft which houses WIMP (weakly interacting massive particles) detection equipment. DRIFT I and DRIFT II detection programmes have been running at Boulby since 2002. The project is aiming to achieve direct observation of WIMPs, which are currently considered to be the prime candidate for the majority of non-luminous matter, the so-called 'missing mass' throughout the Universe that has been proposed as an explanation of observed gravitational effects on the movement of galaxies. The depth and geology of the mine makes it suitable for the experiment by reducing interference from background and cosmic radiation sources.⁶

Review of Historical Mapping

Figures 2274.11 to 2274.14 show a sequence of broadly dated Ordnance Survey map extracts (taken from the NYCC historic mapping website) which demonstrate the historical development of the site and surrounding area.

1846 – 1863

Buildings are present, including a Manor House, at 'Boulby' (referred to in later maps as 'Old Boulby'), with an access track (Boulby Lane) connecting to the main highway at the foot of Boulby Bank. The map infers that an earlier Boulby Hall must have occupied the site before the present buildings were constructed. Woodland cover forms strong patterns within incised valleys and a small to medium size field pattern is evident. There is no evidence of ironstone mining in the area at this time. Contours are shown falling evenly from higher ground at Rockliff Hill/ Boulby Bank south eastwards to Easington Beck valley.

1889 – 1899

The Grinkle Mine is shown including mine head buildings, an air shaft near Twizzie Gill and tramway connection to the Seaton Drift tunnel to Port Mulgrave. Boulby Lane and some buildings remains at Old Boulby but buildings to the east have been removed and the area is now referred to as 'Boulby Hall (Site of)'. Seaview House has been built west of Boulby Lane. The Saltburn and Whitby Branch of the North Eastern Railway is shown completed.

⁶ <http://www.hep.shef.ac.uk/research/dm/intro.php>

A footpath connects northwards from Grinkle Mine, via Old Boulby and Boulby Bank to the modern village of Boulby and the alum working areas further north. Three Crosses Well and multiple 'springs' are shown across the northern half of the site.

1907 – 1924

Boulby Ironstone Mine is now shown including mine buildings, rail head and tramway connection to the drifts in the north. An engine house is shown north of the main road at Boulby Bank (to the rear of the modern property 'Alandale'), with 'Tin City' and powder magazine structures further to the north. The Grinkle Mine incline connection to the railway is not shown at this stage, suggesting that the map was prepared prior to 1916 (when the incline was installed). Boulby Lane, buildings at Old Boulby and Seaview remain present. The branch railway is also present.

The footpath connection northwards to modern Boulby remains but has been diverted westwards under the Boulby Ironstone Mine tramway.

1930 – 1954

All earlier features remain but additional development is shown at Grinkle Mine including the incline and new railhead connection onto the branch line and new surface buildings south of earlier buildings. The Grinkle Mine air shaft near Twizzie Gill is now shown as a fan house. The aerial ropeway shale tipping route from Grinkle Mine to the coast at Long Sand is now shown, although it was present prior to this date.

Post 1954

Modern changes include the removal of most earlier features including mine surface features, the branch railway, Boulby Lane and buildings at Old Boulby, Seaview and 'Tin City'. The main highway has been realigned and upgraded at The Brows/ Boulby Bank to form the modern A174.

5. Environmental Stewardship Scheme

The two large tracts of farmland within the site boundary, to the north west of the railhead and to the east of the A174, are currently cared for under the Environmental Stewardship Scheme, managed by Natural England. The eastern part of the site, including Rabbit Hill Plantation, Boulby Gill, willow planting areas and farmland west of the A174 and farmland beyond the A174, also falls within the North York Moors Higher Level Stewardship Target Area.

Farmland north west of the railhead

This area is primarily arable farmland and is managed under Entry Level Stewardship (ELS) agreement number AG00365264 by F & LH Jackson. This agreement targets the following biodiversity management operations:

- Looking after historic features
- Looking after hedgerows
- Looking after permanent grassland
- Mixed stocking
- Wildlife friendly grass edges and strips (in arable fields)
- Sowing seed mixtures for insects and birds

Farmland north of the A174

This area is also mainly in arable use and is managed under ELS agreement number AG00328383 by F & LH Jackson. This agreement targets the following biodiversity management operations:

- Looking after ditches and dykes
- Looking after permanent grassland
- Looking after species rich hay meadows and pastures
- Mixed stocking

ELS agreements are for a five year period, at this stage it is not known how long the present agreements will continue to run for.

6. Design Approach and Objectives

For areas within the current active minehead the design approach is to remove the majority of minehead structures and restore the site back to a soft end use. For areas outside the minehead, including tracts of existing woodland and farmland, the design approach is one of retention and enhancement, building on the existing fabric to improve landscape and biodiversity value in the long term.

Based on the site setting, historical context and discussion with CPL and the National Park Authority the following key objectives have been developed to inform the overall design of the restoration scheme:

- Create an undulating landform which is sympathetic to local topographical character and enables culverted watercourses under the mine head to be returned to open channels;
- Create a strong, long-term landscape structure which reflects key local characteristics and contributes to the National Park setting;
- Provide early visual improvement and/ or screening of the site during the operational phase in local views;
- Provide increased site security through use of dense thorny planting to the operational mine perimeter;
- Retain and manage existing biodiversity habitats and enhance through provision of new habitats in restored area, supporting existing initiatives where possible;
- Interpret site history, in particular mining history, and reflect within the scheme design as patterns and earthworks;
- Retain existing heritage features and improve settings where possible through management;
- Retain existing agricultural land uses and consider provision of additional agricultural land within the framework established through historical, landscape and biodiversity influences;
- Explore opportunities for improving connections within the local public rights of way network.

In terms of response to landscape setting and visual context the landscape appraisal⁵ identified that the following key landscape characteristics should be incorporated in the preparation of the proposed landscape restoration plan:

- Restore site topography close to pre-mining landforms, including removal or softening of the screening embankment, formation of minor gills along restored watercourses and general softening of the current development plateau;
- Extend woodland cover along the existing Boulby Gill and restored minor gills, to reflect the presence and key local characteristics of mature woodland within incised valleys (as noted along the valleys of Easington Beck and Roxby Beck to the south of site);
- Reinforce and/or restore degraded hedgerow field boundaries to the area north west of the minehead and within the parcel of open farmland north of the A174 near Red House Nab;
- Use tree and shrub species which are local to the area and able to withstand the exposed maritime climate.

In addition, the appraisal identified that interim landscape measures should be implemented ahead of the final restoration works to screen or filter views of the existing site as follows:

- A174 overlooking the site south eastwards from The Brows;
- A174 looking eastwards from the section of road near Red House Farm and the site entrance;
- General screening of low level minehead clutter and activity in views from the north and east.

7. Site Clearance

In general the mine would be closed and made safe in accordance with requirements of the Mines and Quarries Act.

All existing surface structures would be removed with the exception of the concrete winding towers, which could be retained as discussed below.

Foundations would either be removed or left in situ where regrading proposals would enable a minimum cover depth of 1m of new soils to be achieved.

Winding tower and shaft collar foundations would be retained in situ as historic features regardless of whether the winding towers themselves are retained or not.

Shafts would be filled and capped. Culverts running below the site would be uncovered and retained as open channels. Culvert headwalls and settling pond structures would be broken out and replaced with soft construction detailing.

Rails would be removed from the railhead but the stone ballast trackbed would be retained in situ as a historic feature.

All other hard surfaces would be broken out and removed to the full depth of construction except in areas where a minimum of 1m soils cover would be achieved. In these instances

existing surfaces would be punctured or broken up, to aid drainage, and left in situ below soil cover.

All utilities and services would be disconnected at the site boundary and removed from areas within the site.

Potential areas of contamination (eg fuel storage areas) would be checked and remedial work carried out to leave the site in a condition suitable for safe use of a public area.

Care would be taken during site clearance and restoration works to minimise impact on local watercourses, either through escape of contaminants or increased suspended solids. Temporary ponds or surface water holding areas would be constructed as necessary.

8. Proposed Restoration Scheme

Design Template

Historical mapping has been used to develop a basic design template which has then been combined with modern site features and context to help inform the restoration scheme for the site.

Figure 2274.15 shows a template for landscape structure, based on available pre-industrial mapping (1846 – 1863). Field boundaries and woodland pattern are shown, together with changes to the woodland pattern up to the present day. It can be seen that the pre-industrial woodland structure is relatively intact, with a number of modern plantations being added and some small areas of older woodland removed. The impact of site development and modern farming on field boundaries is more evident, with boundaries being removed within the main body of the site and in areas north of the A174.

Figure 2274.16 shows a template for historical site features, including the site of Boulby Hall, the Grinkle Ironstone Mines, Boulby Ironstone Mine and route of the Saltburn and Whitby Railway.

Figure 2274.17 shows key modern features associated with the Boulby Potash Mine including the railhead and shafts.

Restoration Masterplan

Please refer to Figure 2274.18

The end use of the site is proposed as a mosaic of semi-natural woodland and grassland habitats, permeated by pastoral fields with public access.

Existing engineered topography is remodelled to create softer profiles which reflect surrounding landscape character and to enable restoration of culverted watercourses to open channel.

Field and grassland patterns have been interpreted from a combination of 1846 – 1863 mapping and later boundaries associated with the Saltburn and Whitby railway, the ironstone mines and the modern potash mine railhead.

Woodland cover is extended from existing woods within the Easington Beck valley and linked to a strong network of hedgerows, including improved existing boundaries. In combination with existing retained woodland cover this would create a strong landscape structure across the restored site, significantly improving local landscape character.

Existing and new woodland habitats within the overall site boundary would be managed for wildlife and amenity value. Existing and new pasture would be managed as mixed grazing, with the aim of improving sward diversity and wildlife value.

The core of the site contains the locations of former historic features, which would be marked by new earthwork interpretations and overlaid with wildflower grassland. The railhead stone bed and shaft/ winding tower foundations would be retained as physical reminders of the modern potash mine. Interpretation panels would be provided to help visitors understand the rich industrial heritage of the site.

A new public car park would be formed off the existing A174 entrance and connections would be formed to the local public right of way network.

The following habitat extents are proposed within the restoration scheme:

- ...ha existing mixed woodland
- ...ha new native broadleaved woodland
- ...ha coastal scrub and woodland edge zone (including existing area at Boulby Bank)
- ...ha neutral wildflower grassland
- ...ha existing pasture
- ...ha new species rich pasture
- ...ha arable land
- ...km mixed native hedgerow (including incorporation and management of existing remnant hedgerows)

Aspects of the restoration scheme are discussed in more detail below.

Landform & Drainage

The existing potash minehead development plateau would be remodelled to create a series of undulating terraces falling from high ground across the screening mound in the north west to the shoulder of the Easington Beck valley in the south and south east.

The screening mound, immediately west of the modern railhead, would be cut back on its eastern face to create a more varied profile and gentler slopes. The modern railhead would be retained in its current form, at an elevation of approximately 89m AOD. To the south east of the modern railhead, former ironstone minehead development areas would fall gently westwards at regular gradients, allowing earthwork interpretations of earlier mining to be read more easily than would be possible in an undulating landform. The eastern edge of the site would be remodelled at the head of Boulby Gill, creating an indented and irregular interface between the site and Easington Beck valley.

The line of the former incline to Boulby Ironstone Mine would be picked up as a regularised slope cutting across the undulating landform of the remodelled potash minehead area, acting as a reference to earlier ironstone workings on the site. Other historic and industrial heritage features including Boulby Hall, Grinkle Mine incline and railhead, Boulby Ironstone Mine surface buildings and railhead and the line of the former Saltburn and Whitby Railway would be interpreted as a series of ditch and bank earthworks, as discussed further below.

Existing culverts running below the operational mine site would be opened up and reformed as surface channels, running across the new landform and connecting to existing watercourses on the north western flank of Easington Beck valley. The existing wide ditch running along the western edge of the screening mound would be retained in its present

form. New watercourses would be accompanied by a series of permanent ponds and flushes to maximise wildlife value and reduce the rate of surface water runoff from the site.

No landform changes would occur within the areas of existing farmland to the north west of the screening mound and north east of the A174.

Woodland, Coastal Scrub & Hedgerows

Existing semi-natural woodland and plantations running along Easington Beck valley would be extended northwards into the site, along the forks of Boulby Gill, up to and including Red House Field, and wrapping around the former site of Boulby Hall in the centre of the potash minehead site.

Broadleaved tree blocks, within the core of new woodland areas, would give way to dense coastal scrub at the edges, creating natural shelterbelts and increasing ecological diversity.

Coastal scrub would be extended along the A174 frontage to screen the proposed visitor car park.

New hedgerow boundaries would be formed around the Red House Field, around new fields within the restored mine head and along former historic boundaries in fields north of the A174 and north of the screening mound. After regrading of the screening mound, hedgerow boundaries would be extended down to and along the northern edge of the railhead.

Offsite blocks of coastal scrub would be established within highway land (subject to agreement with the highway authority) at Boulby Bank and near Red House, to provide improved screening of the mine during its operational life and improve habitat connectivity in general.

Existing woodlands within the site boundary would be managed for wildlife and amenity value, with non-native trees being managed out over time, in favour of creating glades or replanting with native species.

Native tree and shrub species would be used throughout in new planting areas, with species choice being based primarily on presence within existing nearby woodlands and hedgerows and suitability for the local maritime climate.

Field Pattern & Pasture

The proposed field pattern would create small to medium size fields (ranging between 1.4 – 4.5ha in size), closely based on post-Enclosure historic mapping and in keeping with local landscape character.

Mixed grazing use with minimal fertiliser application would be encouraged, to develop a species rich sward, within new pastoral fields and existing fields south of the A174.

Existing arable use within fields to the north west of the mine and north of the A174 would be retained although a review would be undertaken to explore the benefits of sowing these fields to permanent pasture subject to acceptable impact on tenant farmer businesses.

Heritage Features

The general design approach adopted is to retain existing physical remains and interpret the location of former (removed) boundaries and structures with new earthworks.

Settlement at Old Boulby, including the site of Boulby Hall, would be marked by ditch and bank earthworks, with the footprint of former building locations being built up, to 1.0m above ground level with 1 in 1 side slopes, and old boundaries being marked by 0.5m deep ditches with 1 in 1 sides. The line of the former Boulby Lane, leading to Boulby Hall, would also be marked with side ditches.

Existing remains of the Grinkle Ironstone Mine, including the Easington Beck culvert, concrete surface structures and the Sirocco fan house would be conserved. The route of the Grinkle incline up to the former Saltburn and Whitby Railway would be marked by a twin line of stone blocks and former sidings would be marked by 0.5m high raised earthworks.

The former route of the Saltburn and Whitby Railway would be marked by a combination of boundary ditches and 0.5m high raised earthworks along track lines across flatter areas in the west and an open ride between woodland blocks and hedgerows in the east. This route would also form an important new east-west footpath connection across the site.

Boulby Ironstone Mine and associated drift incline would be marked by boundary ditches, 1m high raised earthworks in areas of former buildings and 0.5m high raised earthworks to demarcate sidings and railhead tracks. The former reservoir would be retained, although public safety works may be required. Encroaching woodland and scrub would be cleared from the former drift entrance near Boulby Bank and a route opened up to the mine entrance along the line of the former incline. A single line of stone blocks would be placed along the incline to reinforce the visual connection between drift entrance and railhead.

Boulby Potash mine would be marked by retention of the modern railhead trackbed and shaft/ winding tower foundations. An option exists to completely or partially retain the unique cylindrical concrete winding towers, with their bold, rugged form being in keeping with the exposed character of this edge of the National Park. It is understood that the towers are removable, allowing a further option of moving them slightly away from the shafts, pushing them over or lowering them to the ground and leaving the remains in situ. All exposed metalwork would be removed and the remains made safe.

Interpretation panels would be provided at key locations to help explain the rich industrial heritage of the site.

Vehicle and Pedestrian Access

The existing mine access onto the A174 would be reused as the entrance to a new visitor car park. At this stage car park numbers have not been agreed but room for 20 - 30 cars is envisaged, laid out in an informal manner, with unmarked bays.

Access via public transport is also possible, with westbound bus services stopping next to the site entrance and eastbound services stopping at Cowbar Lane. Access from bus stops at the top of Boulby Bank would also be possible.

Access to fields and for general site maintenance would be via new tracks extending from the site entrance along the line of the former Boulby Lane and route of the Saltburn and Whitby Railway (both as noted on historic maps).

Existing public rights of way would remain unaltered, with the exception of Footpath 504 (Easington) which would be diverted to run along the line of the former Boulby Lane (taking advantage of the stone access track).

Although the whole of the site, outside fields and woodland blocks, would be open to public access, key routes would be marked through the site as follows:

- Connection to A174 footpath opposite Red House Farm, running west into the site along the route of the former Saltburn and Whitby Railway and exiting the site to meet existing rights of way running along the western edge of the site;
- Connections from the new car park south and west into the main body of the site along the route of the former Boulby Lane and the modern railhead trackbed;
- South-east to west and north-west connections from footpaths running through Easington Beck valley, across the main body of the restored site, linking to new paths described above and continuing to the A174 at Boulby Bank and footpath links northwards to the Cleveland Way.

Access from the Cleveland Way, running across the northern part of the site, would be via Cowbar Lane and the minor road leading to Boulby Lodge, with access into the site via the main site and Red House Farm entrances respectively.

9. Implementation Techniques

This section of the report provides an overview of the techniques and materials that would be used to implement the restoration scheme and relevant issues that need to be considered.

Detailed proposals for each section of works would be submitted at the appropriate time for approval by the planning authority before work commences.

Access & Fencing

3m wide access tracks, comprising 300mm compacted depth of Type 1 stone or equivalent (eg crushed concrete/ recycled aggregate) over an approved type geofabric, would be provided to allow general maintenance access and farm access to fields. A connection would be formed from the mine to the existing Easington Woods access track, to assist with long term management of the woods.

The proposed car park would be enclosed with 3 bar wooden post and rail fencing and a hedgerow with motorcycle proof accessible gates and timber farm access gate. Car park surfacing would comprise running ways of unedged bitumen macadam over a stone subbase, with compacted stone parking zones. Surface water drainage would be to open swales.

New pastoral fields would be enclosed with timber post and galvanised mesh stockproof fencing, to contain stock and protect new hedgerow planting during the establishment period. Timber field gates would be provided at field access points.

New or reinforced hedgerows in existing arable fields would only receive stockproof fence protection if land use is changed to a pastoral farming regime.

Timing of Works

Regrading and soil handling works would be undertaken during periods of dry weather, with the bulk of operations expected to be carried out in the summer months.

Plant handling and planting operations would be carried out in accordance with good horticultural practice during the November – March bare root planting season and during periods when the ground is not waterlogged or frozen.

Seeding would be undertaken during the recognised early spring and early autumn sowing periods.

Soil Handling

Restoration works would be undertaken in accordance with recognised principles of best practice, contained in documents including the MAFF Good Practice for Handling Soils (2000) guide and the Department of Environment Good Practice Guidance for the Reclamation of Mineral Workings to Agriculture (2006). Key principles include:

- Separate stripping and removal of topsoil and subsoil from existing screening mounds and grassed areas within the minehead site, including temporary storage where necessary;
- Location of temporary topsoil and subsoil heaps so as to avoid cross-contamination of materials and the trafficking of soil heaps by construction traffic;
- Careful timing of soil handling operations, avoiding freezing or waterlogged conditions;
- Choice of soil handling machinery and method for its use, in order to reduce potential for soil compaction and soil damage; and
- Careful supervision of soil handling operations on site.

Soil Type and Depth

Existing topsoils and subsoils would be retained in areas of the site which lie outside the screening mound and potash minehead footprints.

Following removal of development features, hard surface cover and footings and prior to commencement of bulk cut and fill operations, including regrading of the screening mound and minehead area, existing topsoils and subsoils would be stripped and stored for re-use.

Better quality subsoils would be directed first to proposed pastoral fields, to supplement existing subsoils as necessary to achieve a minimum cover of 500mm clean, free draining subsoil over subgrade.

Should poor quality bulk fill (eg rock, shales) be exposed during cut and fill operations this material would be placed in locations where a minimum subsoil cover of 500mm depth in hedgerow and woodland planting areas and 300mm in wildflower areas can be achieved. Where underlying substrates have potential to support unusual habitats, or to create general substrate variety, which may be of longer term biodiversity benefit, the scheme would be adapted at detailed design stage to take this into account.

Topsoil resources are finite at the site and would be used in the following order of priority:

- provide a minimum depth of 200mm topsoil over proposed pastoral fields;
- provide a minimum depth of 300mm x 2m width of topsoil along proposed hedgerows;
- use remainder of topsoil resource to provide 300mm cover in woodland planting areas, with the balance of woodland areas to receive an application of approved type soil improver (eg composted green waste of conditioned sewage cake, applied in accordance with standard environmental protection measures).

Wildflower areas would be established directly on spread subsoils.

Should compaction of soils occur in proposed woodland planting areas deep cultivation would be undertaken using a winged tine ripper with blades set at 1000mm centres and 700mm depth. Direction of ripping would be at 30° to contours on slopes steeper than 1 in 4 gradient.

Wildflower Grassland and New Pastoral Fields

Neutral grassland areas in new pastoral fields and proposed wildflower meadows would be established on previously spread topsoils and subsoils using a proprietary seed mixture that matches site conditions and the aim of achieving species rich swards and tall ruderal areas. If practicable, hay crops would be taken from nearby suitable donor sites and used as a substitute or supplement for the proprietary seed mix. The proposed mix includes *Rhinanthus minor* to help decrease the vigour of grass species.

Neutral Grassland & Wildflower Mix (application rate 3gms/m2 in wildflower areas, 15gms/m2 in fields)		
Grasses (82% by weight)		
<i>Festuca rubra ssp rubra</i>	strong creeping red fescue	22%
<i>Cynosurus cristatus</i>	crested dogtail	18%
<i>Agrostis capillaris</i>	common bent	14%
<i>Dactylis glomerata</i>	cocksfoot	14%
<i>Festuca pratensis</i>	meadow fescue	6%
<i>Trisetum flavescens</i>	golden oat grass	6%
<i>Anthoxanthum odoratum</i>	sweet vernal grass	2%
Wildflowers (18% by weight)		
<i>Plantago lanceolata</i>	ribwort plantain	2%
<i>Achillea millefolium</i>	yarrow	1%
<i>Centaurea nigra</i>	common knapweed	1.5%
<i>Filipendula ulmaria</i>	meadow sweet	1.5%
<i>Galium verum</i>	lady's bedstraw	1%
<i>Leucanthemum vulgare</i>	ox-eye daisy	1.5%
<i>Knautia arvensis</i>	field scabious	1%
<i>Prunella vulgaris</i>	selfheal	1.5%
<i>Ranunculus acris</i>	meadow buttercup	1.5%
<i>Ranunculus bulbosus</i>	bulbous buttercup	1%
<i>Agrimona eupatorium</i>	agrimony	1%
<i>Leontodon autumnalis</i>	autumn hawkbit	1%
<i>Rhinanthus minor</i>	yellow rattle	1%
<i>Lotus corniculatus</i>	bird's-foot trefoil	0.5%
<i>Daucus carota</i>	wild carrot	1%

Cultivation operations would comprise harrowing and rolling, to create a fine tilth and firm seed bed.

For wildflower areas, on subsoils, a light application of low nitrogen pre-seeding fertiliser would be used to encourage initial sward development on the nutrient poor subsoil substrate.

In pastoral fields, on topsoils, no fertiliser would be used.

A first cut would be undertaken approximately 8-12 weeks after sowing in pastoral fields or when the sward reaches a height of 100mm on subsoils in wildflower areas, to encourage tillering. Arisings are to be removed.

Undersowing of New Woodland Planting

Woodland areas would be undersown with a low competition grass mix to bind the soil surface and reduce weed competition. Wild red clover and bird's-foot trefoil would be included in the mix to fix nitrogen and provide nectar sources. Seeding would be by broadcast methods using low ground pressure tractors to minimise soil compaction. No fertiliser would be applied.

Woodland Area Grass Mix (application rate 3gms/m²)		
Festuca arundinacea	tall fescue	10%
Festuca rubra	red fescue	35%
Festuca filiformis	fine-leaved sheep's fescue	25%
Poa pratensis	smooth stalked meadow grass	20%
Trifolium pratense	red clover	8%
Lotus corniculatus	bird's-foot trefoil	2%

Hedgerows

New hedgerows to field boundaries would comprise a mix of native shrub species, based on species recorded within the local area.

Hedgerow Planting Mix, double row 300mm apart, 6 plants per lin/m				
Botanical Name	Common Name	%	Size	Type
Prunus spinosa	blackthorn	40	20-40	BR
Crataegus monogyna	hawthorn	35	20-40	BR
Rosa canina	dog rose	10	45-60	BR
Salix caprea	goat willow	10	60-90	BR
Ilex aquifolium	holly	5	20-40	2L pot

All hedgerow species would be planted direct into previously spread soils (after clearance of existing weed and grass cover to 900mm wide along the line of the hedge if applicable), with rotovation to 200mm depth and incorporation of 50mm settled depth approved type planting compost. 75mm settled depth approved type bark mulch would be applied 900mm wide along the line of the hedge after planting. All species would be protected with an approved type biodegradable shelter (eg Acorn Shelterguard, with support stake and tie), to help initial establishment and prevent rabbit or vole damage.

Hedgerow planting would be in random groups of 5 – 11 of any single species. All species would be cut back to 200mm after planting to encourage strong bushy growth.

Woodland and Scrub

New broadleaved woodland would comprise a mix of native species found in the local area. Woodland areas would include a shrub component to provide initial shelter for trees and wildlife. Over time the planting mix would evolve into true woodland cover within more sheltered areas whilst remaining as coastal scrub/ woodland edge in more exposed

locations. Woodland edges would also be protected with a coastal scrub mix along the eastern edge of planting areas.

Woodland Mix (3000 plants/ ha, random spacing)				
Botanical Name	Common Name	%	Size (cm)	Type
Trees				
Acer pseudoplatanus	sycamore	20	45-60	BR
Quercus robur	oak	20	45-60	
Fraxinus excelsior	ash	10	60-90	BR
Prunus avium	wild cherry	5	60-90	
Ulmus glabra	Wych elm	5	45-60	BR
Shrubs				
Crataegus monogyna	hawthorn	15	45-60	BR
Prunus spinosa	blackthorn	10	45-60	BR
Salix caprea	goat willow	10	60-90	BR
Ilex aquifolium	holly	5	20-40	2L pot

Coastal Scrub Mix (5000 plants/ ha, random spacing)				
Botanical Name	Common Name	%	Size	Type
Prunus spinosa	blackthorn	45	45-60	BR
Crataegus monogyna	hawthorn	20	45-60	BR
Rosa canina	dog rose	10	45-60	BR
Salix caprea	goat willow	10	60-90	BR
Ulex europaeus	gorse	10	20-40 3 breaks	2L pot
Ilex aquifolium	holly	5	20-40 3 breaks	2L pot

The use of Fraxinus would be reviewed prior to planting depending on the progress of Chalara fraxinea (ash dieback disease) with substitution by an alternative species agreed with the planning authority if necessary.

In damper areas Salix caprea would be substituted with Salix cinerea (Grey Sallow).

All woodland and scrub species would be planted direct into existing or previously spread soils (after clearance of existing weed and grass cover to 900mm diameter at each planting station), 75mm settled depth approved type bark mulch would be applied to 900mm diameter at each planting station. All species would be protected with an approved type biodegradable shelter (eg Acorn Shelterguard, with support stake and tie), to help initial establishment and prevent rabbit or vole damage.

Subject to analysis of topsoil or improved subsoil planting media additional planting compost and slow release compound fertiliser may also be applied at each planting station.

Planting would be in random groups of 5 – 11 of any single species. All shrub species would be cut back to 200mm after planting to encourage strong bushy growth.

Red House Field

Earlier planting in Red House Field has only achieved partial success. Willow cultivar nurse crop planting is well established but little evidence remains of the proposed native tree and shrub species which should be growing between the nurse crop areas. The cause of failure is not known but is likely to be a combination of competition pressure from strong weed and grass growth in the area, browsing by rabbits and the severe maritime climate. Soils within

the field appear to be original agricultural soils, with 300mm depth of good quality topsoil noted in trial pits. A central wet flush/ natural spring zone is less suitable for planting and should be developed as wetland habitat for biodiversity benefit. Part of the field appears to be in use for rearing/ feeding game birds. Post and mesh fencing with attached rabbit proof netting which surrounds the field has been breached.

The following measures are proposed to assist establishment of new long term planting within this area:

- Retain existing willow planting as shelter for new planting;
- Clear existing grass and weed growth in areas between willow planting and re-sow with a low competition sward (see woodland area sward above);
- Plant new native tree and shrub species (mixes as above) within cleared areas including provision of shelters, mulch and weed control during the establishment period;
- Remove willow planting after new native planting is established (eg between years 5-10 after planting) and leave cleared willow areas as permanent openings, to be allowed to colonise naturally;
- Perimeter fencing would be renewed to retain stockproof performance but rabbit mesh would not be provided (with browsing protection being provided by shelters).

Off-site Planting by Agreement

To achieve improved initial screening of the site several areas of off-site planting, within the highway boundary of the A174, are proposed at Boulby Bank and Red House.

Proposals in these areas are therefore subject to receiving agreement from the Borough of Redcar and Cleveland. It is envisaged that planting and maintenance works would be carried out under licence to the highway authority.

A separate mix is proposed for initial off-site screening areas, comprising a more limited palette of the most robust tree and shrub species to improve initial screening success.

Off-site Tree & Scrub Mix (5000 plants/ ha, random spacing)				
Botanical Name	Common Name	%	Size	Type
Prunus spinosa	blackthorn	30	45-60	BR
Acer pseudoplatanus	sycamore	30	45-60	BR
Crataegus monogyna	hawthorn	20	45-60	BR
Salix caprea	goat willow	10	60-90	BR
Ulex europaeus	gorse	10	20-40 3 breaks	2L pot

All species would be planted direct into existing soils (after clearance of existing weed and grass cover to 900mm diameter at each planting station), 75mm settled depth approved type bark mulch would be applied to 900mm diameter at each planting station. All species would be protected with an approved type biodegradable shelter (eg Acorn Shelterguard, with support stake and tie), to help initial establishment and prevent rabbit or vole damage.

Subject to existing soil depth and quality additional planting compost and slow release compound fertiliser would be added at each planting station prior to planting.

Habitat Enhancement Measures

Additional habitat management measures would include:

- Excavation of the sides of the existing wetland area in Red House Field to form a larger flush/ marsh habitat. The expanded areas would be left to recolonise naturally;
- Profiling of the restored landform along open water channels to create pools and wetland flushes;
- Provision of bird and bat boxes on retained mature trees around the perimeter of the site;
- Sowing of pockets of wild bird seed mixtures to provide winter food and cover.

Public Access

It is envisaged that the site would be opened for public access 12 months after completion of restoration works. This would be subject to agreement with the planning authority and would also be dependent on the success of initial scheme establishment.

Proposed public footpaths would be unsurfaced, except where coincident with historic feature markers or farm/woodland access tracks. Footpath routes and connections to the wider public rights of way network would be marked with agreed type finger signs at agreed locations.

The existing stone access track through Easington Woods would be retained for both public access and woodland management purposes.

Interpretation

Existing industrial heritage remains, new earthwork interpretations of lost features and selected remnants of Boulby Potash Mine would be interpreted through a series of interpretation panels located across the site. These would provide information about:

- The pre-industrial landscape including Boulby Hall and Old Boulby
- Grinkle Ironstone Mine and associated features
- Saltburn to Whitby branch railway
- Boulby Ironstone Mine and associated features
- Tin City (although note that the remains of this feature lie just outside the site boundary)
- Boulby Potash Mine

In addition, some interpretation of flora and fauna at the site may also be beneficial.

The format and content of interpretation panels would be agreed with the planning authority at the time of implementation.

10. Aftercare Operations and Long Term Management

Aftercare Period

Following completion of implementation works restored areas would enter a 5 year aftercare period.

The key elements of the aftercare requirements for each of the identified end uses within the site are described below:

- Beating up of woodland, scrub and hedgerow planting to ensure a 100% establishment rate and fully complete hedgelines without gaps;
- Maintenance of a 900mm width strip along hedgelines and 900mm diameter circle around other plants in a weed and grass free condition for 36 months after planting or until the end of the aftercare period if establishment is slower than expected;
- Checking and firming of shelters, stakes and ties, with removal at the first horticultural sound opportunity or at the end of the aftercare period;
- Checking and repair of stone access tracks and stockproof fencing;
- Annual mid-late July cutting back of wildflower grassland areas and new pastoral fields, after seed has set and fallen, with arisings to be removed. In low nutrient wildflower grassland areas on subsoils it is anticipated that the first cut would be required in year 2 or 3 after sowing;
- After initial sward establishment (using annual late summer cutting and removal of arisings for a 2 year period after sowing) pastoral fields would be managed using mixed grazing techniques;
- Eradication of notifiable or pernicious weeds in planting areas, wildflower grassland and pasture areas;
- Slow release compound fertiliser may be applied to tree, scrub and hedgerow planting in years 2 and 3 if considered beneficial to growth. No fertilisers or other nutrients would be applied to any grassland areas after sowing;
- Hedges would be allowed to reach a design height of 2m before commencing cutting, after which they would be developed in shape to match existing local hedgerows.

A report summarising the overall progress in aftercare would be submitted to the MPS annually. This report and the proposed programme for the following year would be discussed and amended as necessary annually at a meeting with representatives from the MPA.

Long Term Management

A long term integrated landscape and ecological management plan for the site would be produced and agreed with the planning authority. This will guide the establishment of new restoration habitats and put forward measures for good management of existing habitats, including during the period whilst the mine remains operational.

All existing and new habitats would be managed for nature conservation purposes. Management would be flexible and targeted towards supporting key habitat types and

species, based on the findings of the 2012 Phase 1 habitat survey and earlier ecological studies.

Existing and new pasture would be managed as permanent grassland using mixed stocking techniques to encourage sward diversity (eg see English Nature Technical Information Note TIN088 'Illustrated guide to managing neutral pasture for wildlife').

Remaining archaeology and industrial heritage features within the site boundary would be subject to separate management, in line with current good practice and to conserve the historic resource until such time as the site is restored and opened up to public access, after which time it would be cared for as part of the overall long term management of the site.

11. Phasing

Landscape restoration and management works would be implemented in a phased manner as follows:

November 2012 – March 2013

- Off-site screen planting works by agreement in highway verges at Boulby Bank and Red House;
- Hedgerow planting and reinforcement to existing fields north west of the screen embankment and north of the A174 (subject to tenancy agreement timing, if delays occur these works would move back to winter 3013/ 2014).

April 2013 – September 2013

- Clearance of existing weed and grass growth in areas to be replanted within Red House Field;
- Pond/ wetland works within Red House Field;
- Management/ weed control of newly planted areas.

November 2013 – March 2014

- Scrub and woodland replanting works within Red House Field

March 2014 – mine closure

- Management/ weed control of newly planted areas;
- Ongoing management of existing woodland, hedgerows and pastoral habitats outside the operational mine area;

Final restoration following mine closure

- Implementation of regrading and restoration works across the operational mine site and footprint of the screening embankment;
- Five year aftercare period to ensure scheme is properly established.

End of aftercare period

- Site enters long term management plan.

FIGURES

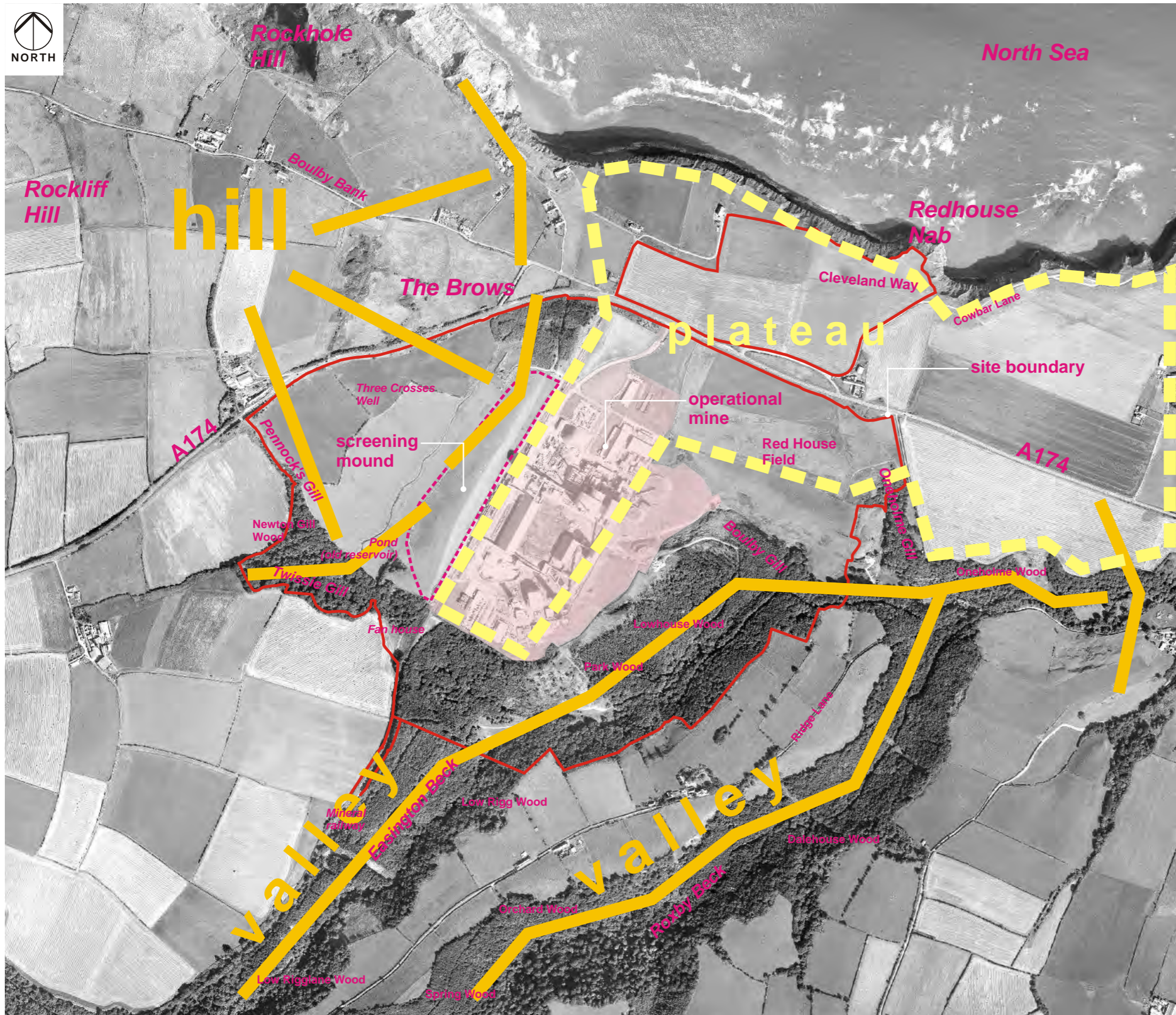


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Figure 2274.01
Existing Site

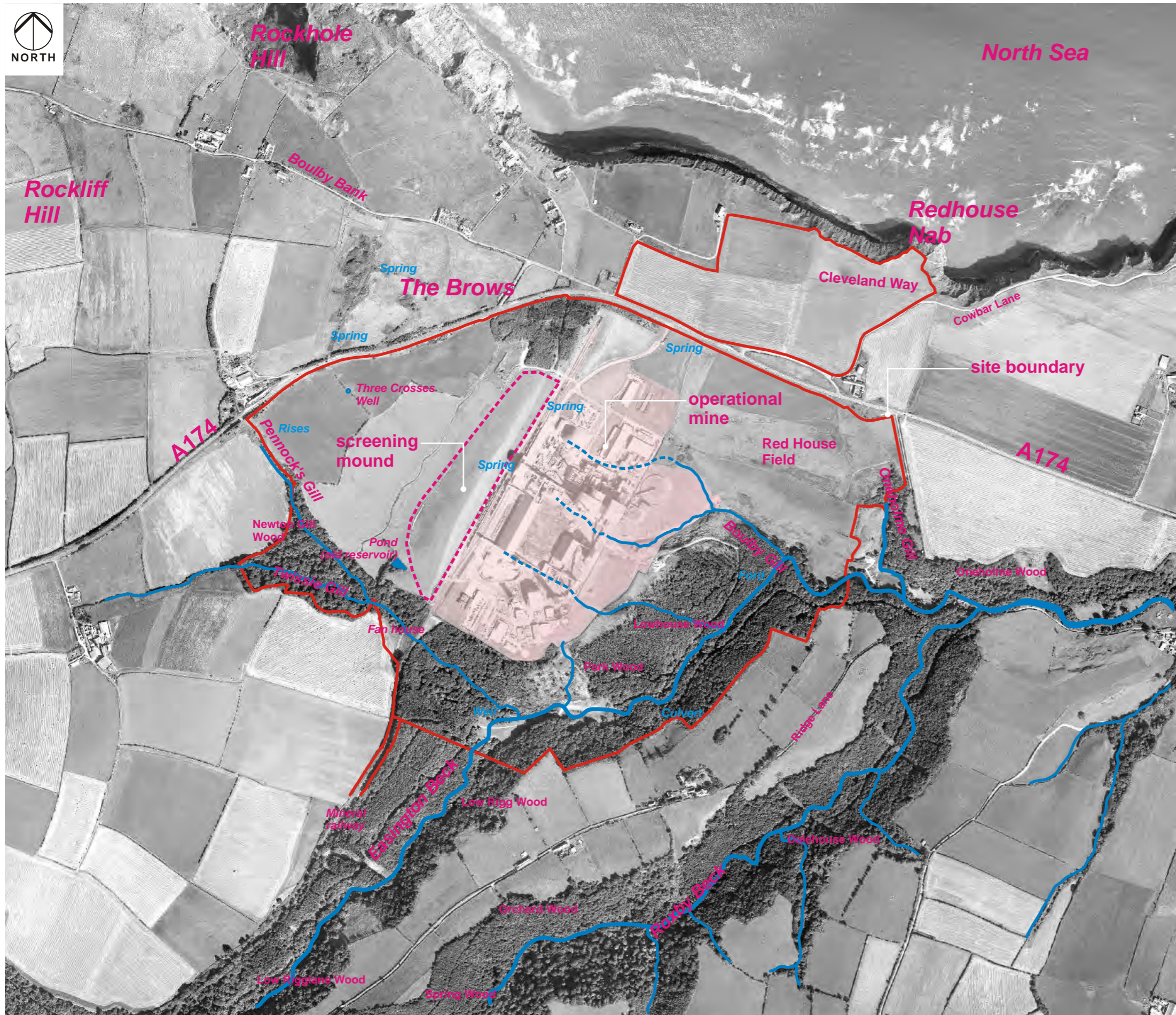


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Figure 2274.02
 Topography



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Figure 2274.03
Watercourses

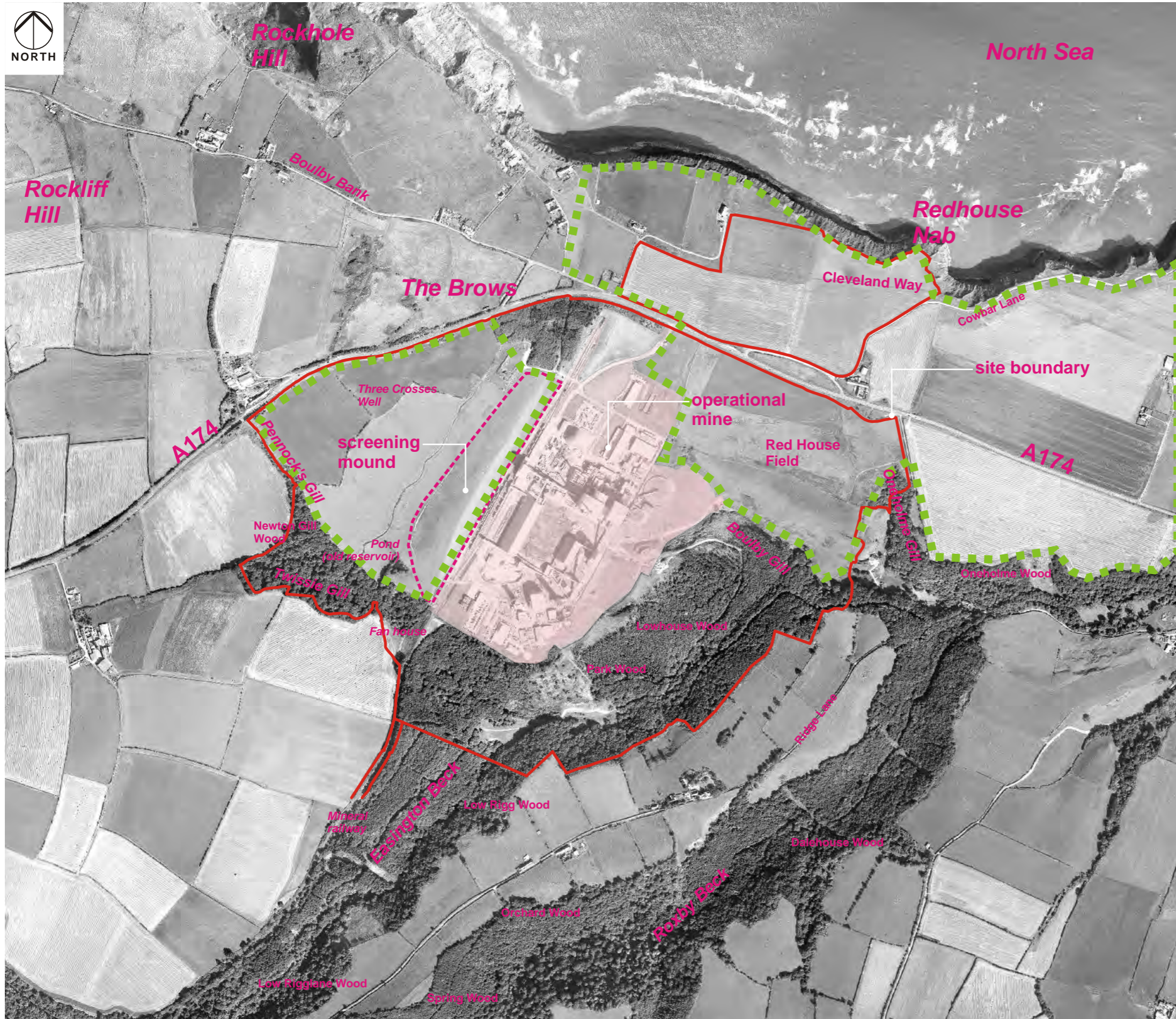


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Figure 2274.04
Woodland Cover

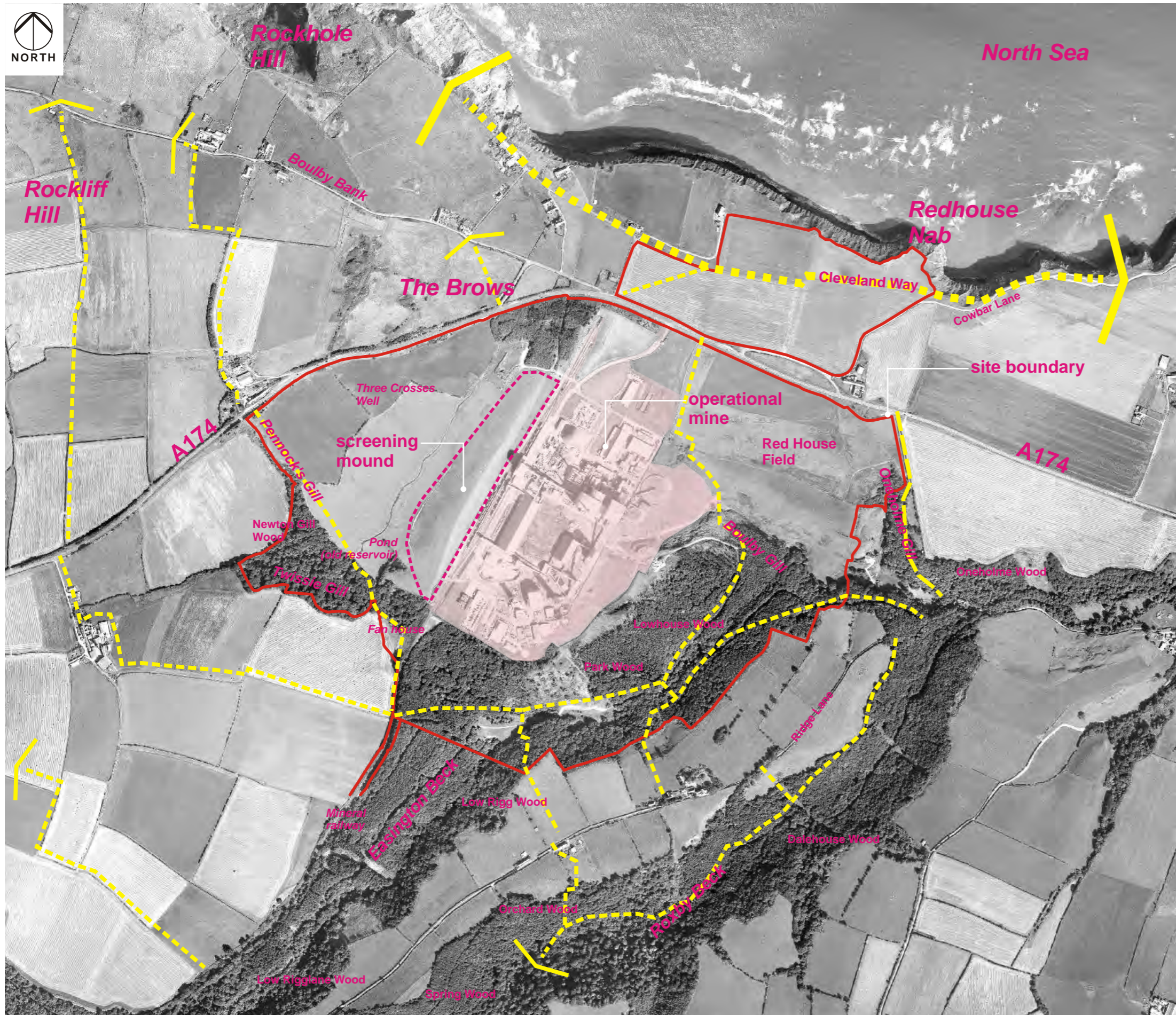


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Figure 2274.05
Eroded Field Boundaries



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Figure 2274.07
 Public Rights of Way

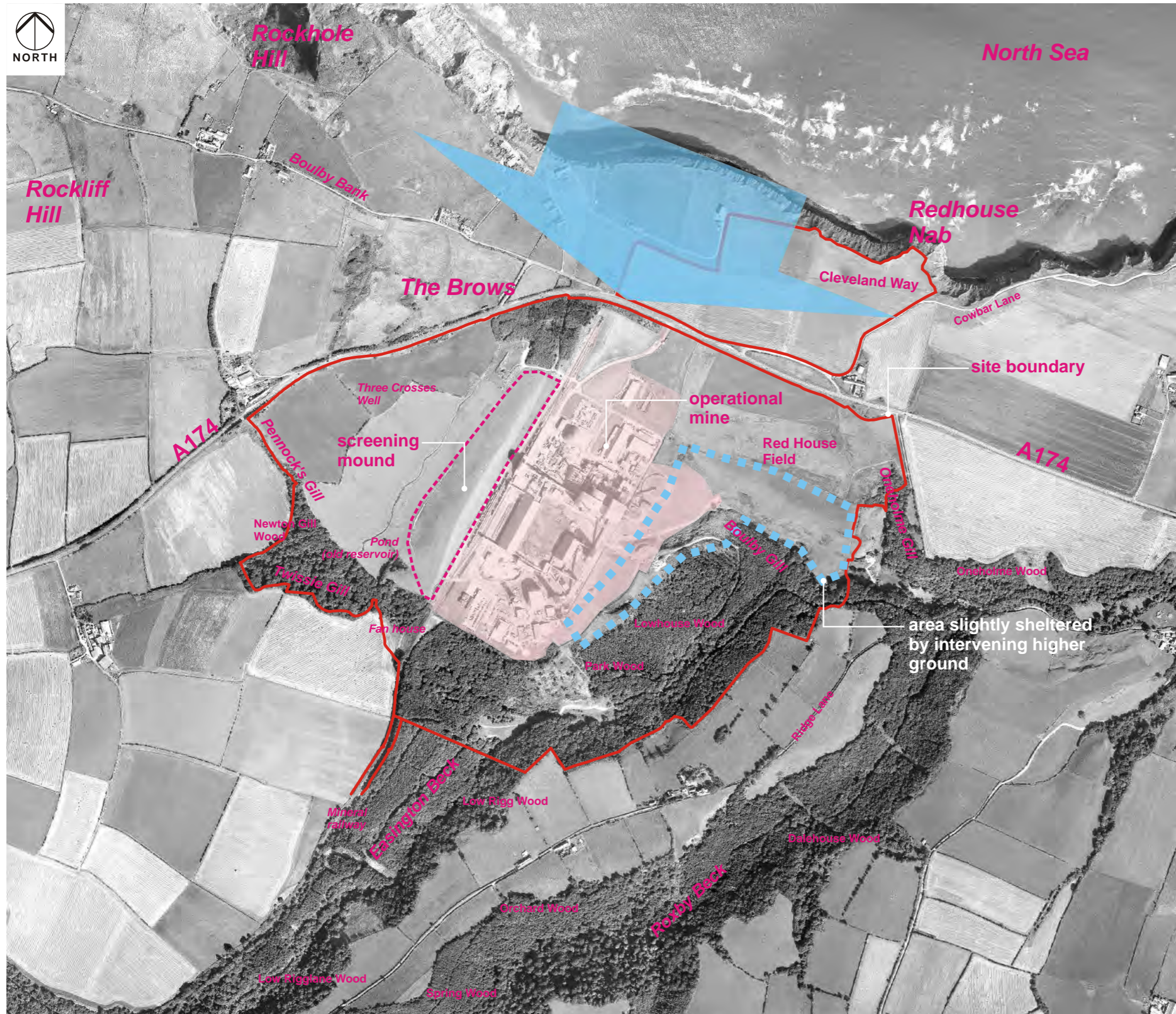


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Figure 2274.06
Panoramic Views

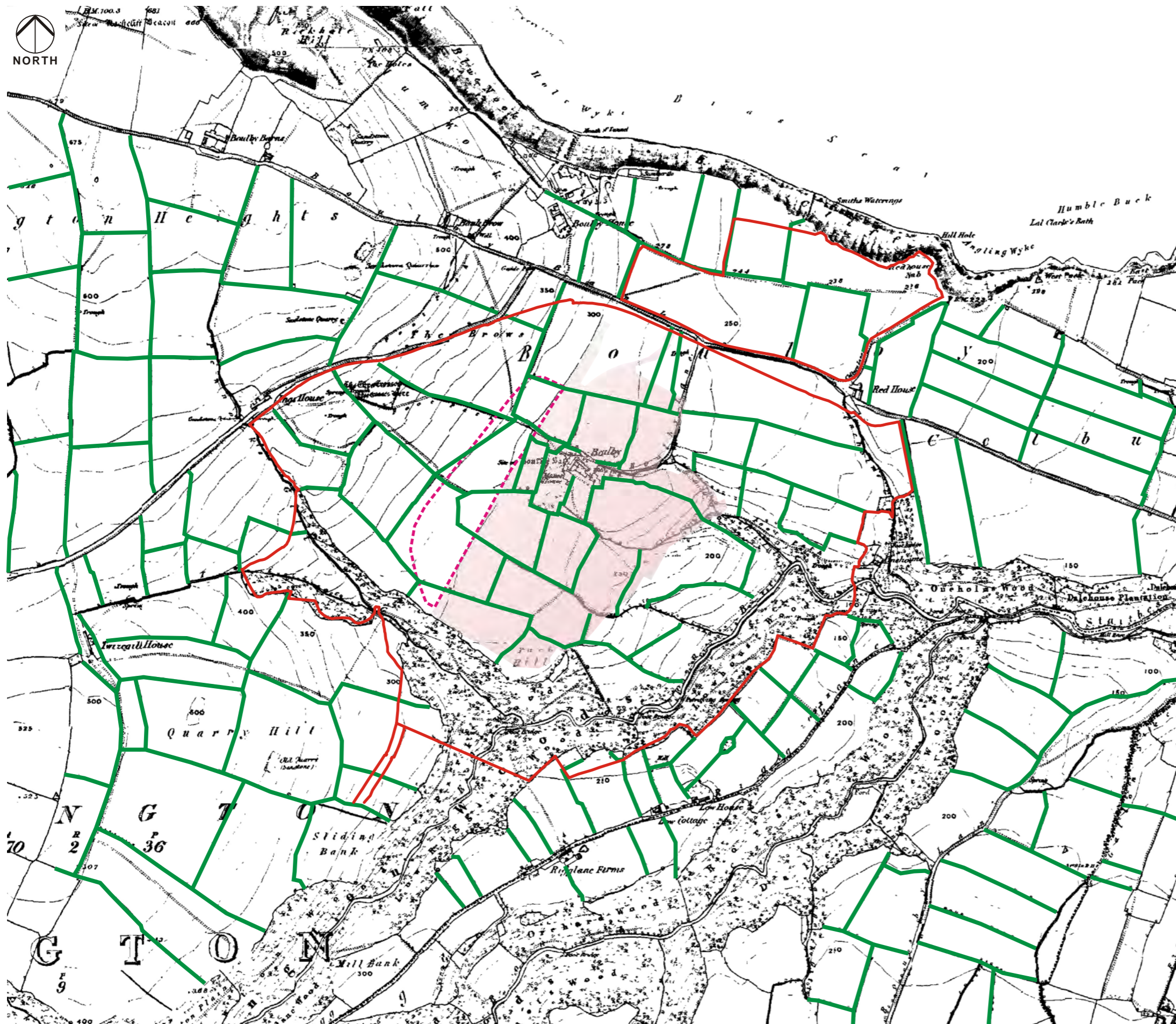


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Figure 2274.08
 Maritime Climate

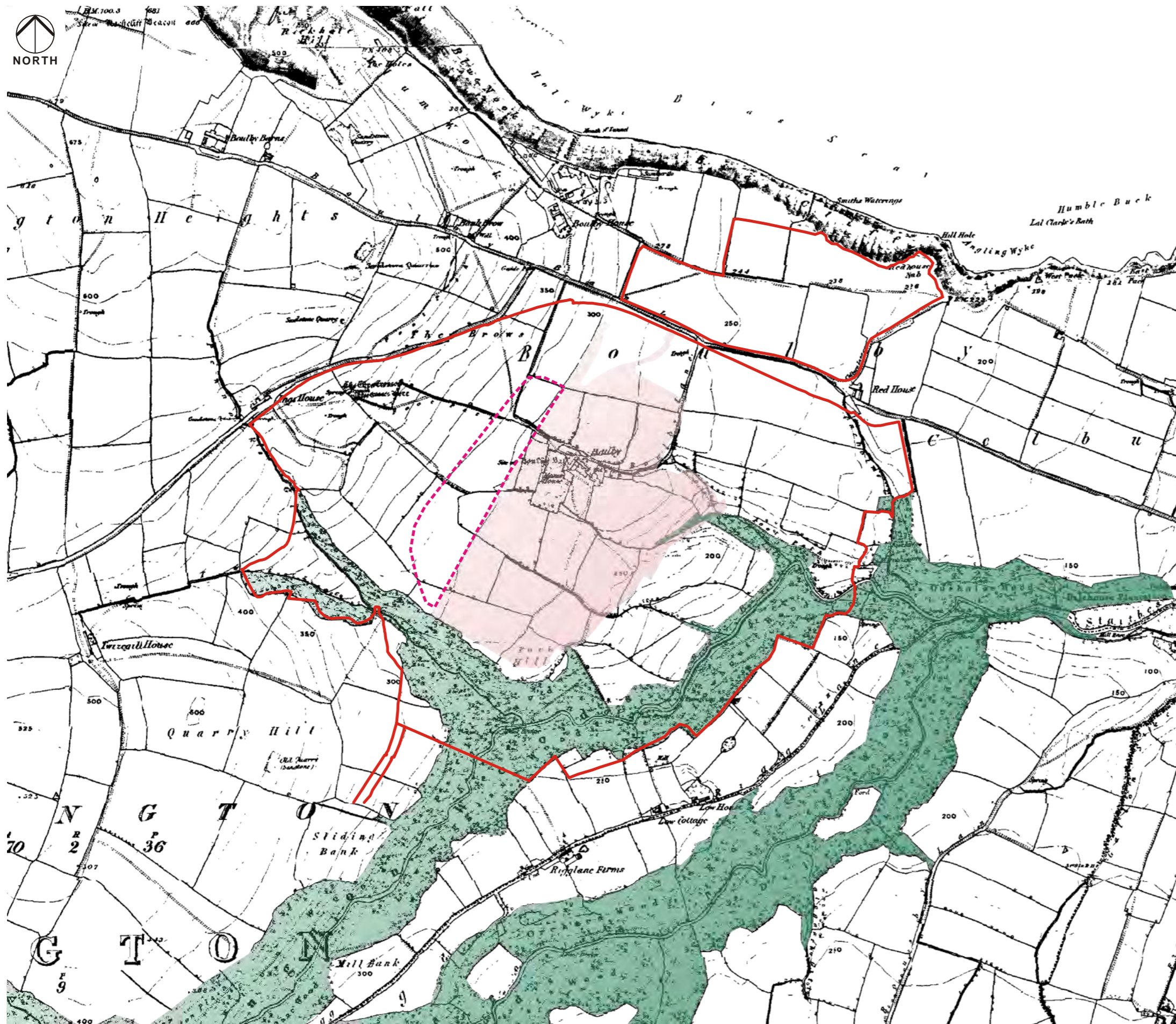


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Figure 2274.09
Historic Mapping
Field Boundaries 1846 - 1863

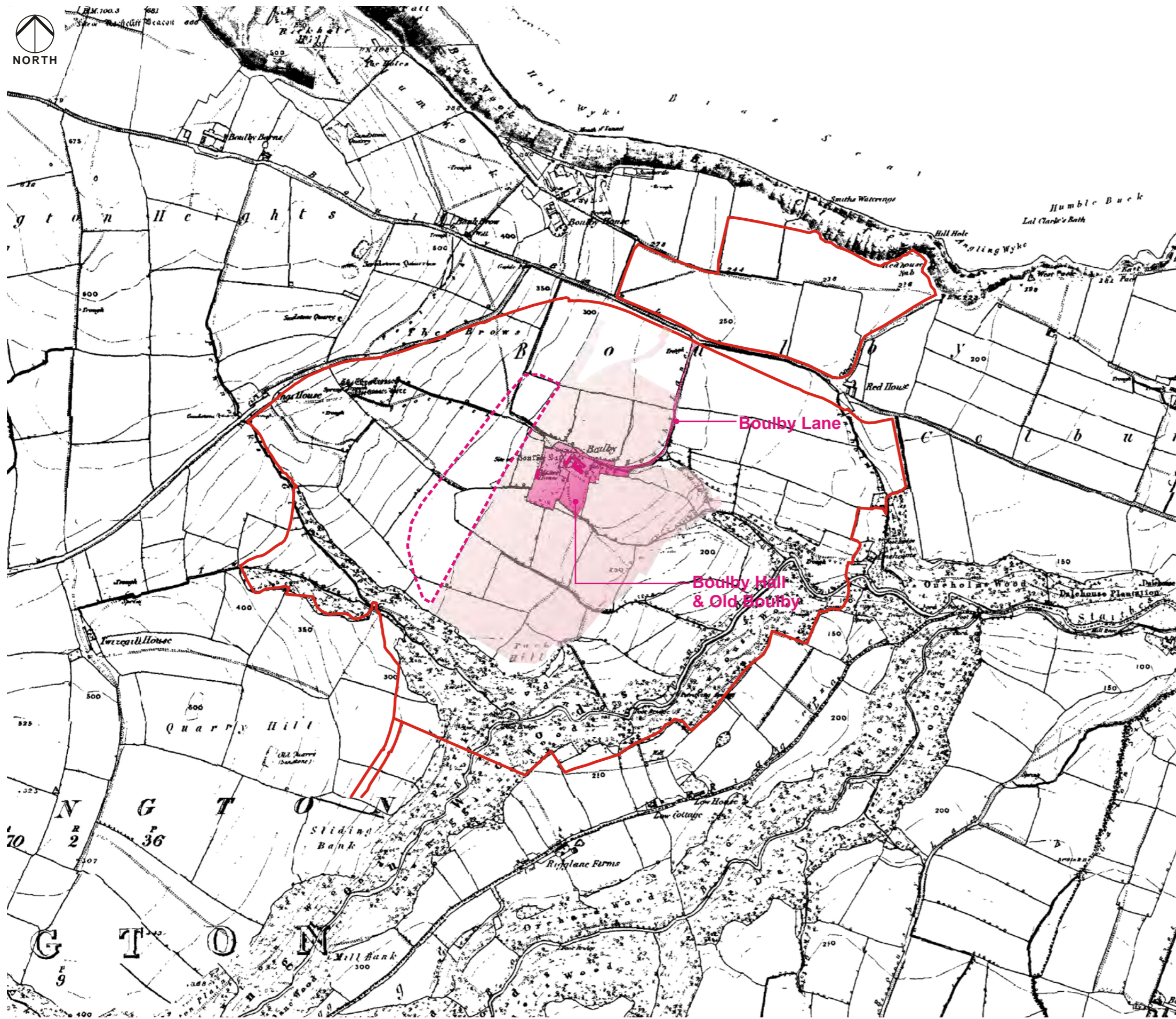


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Figure 2274.10
Historic Mapping
Woodland 1846 - 1863

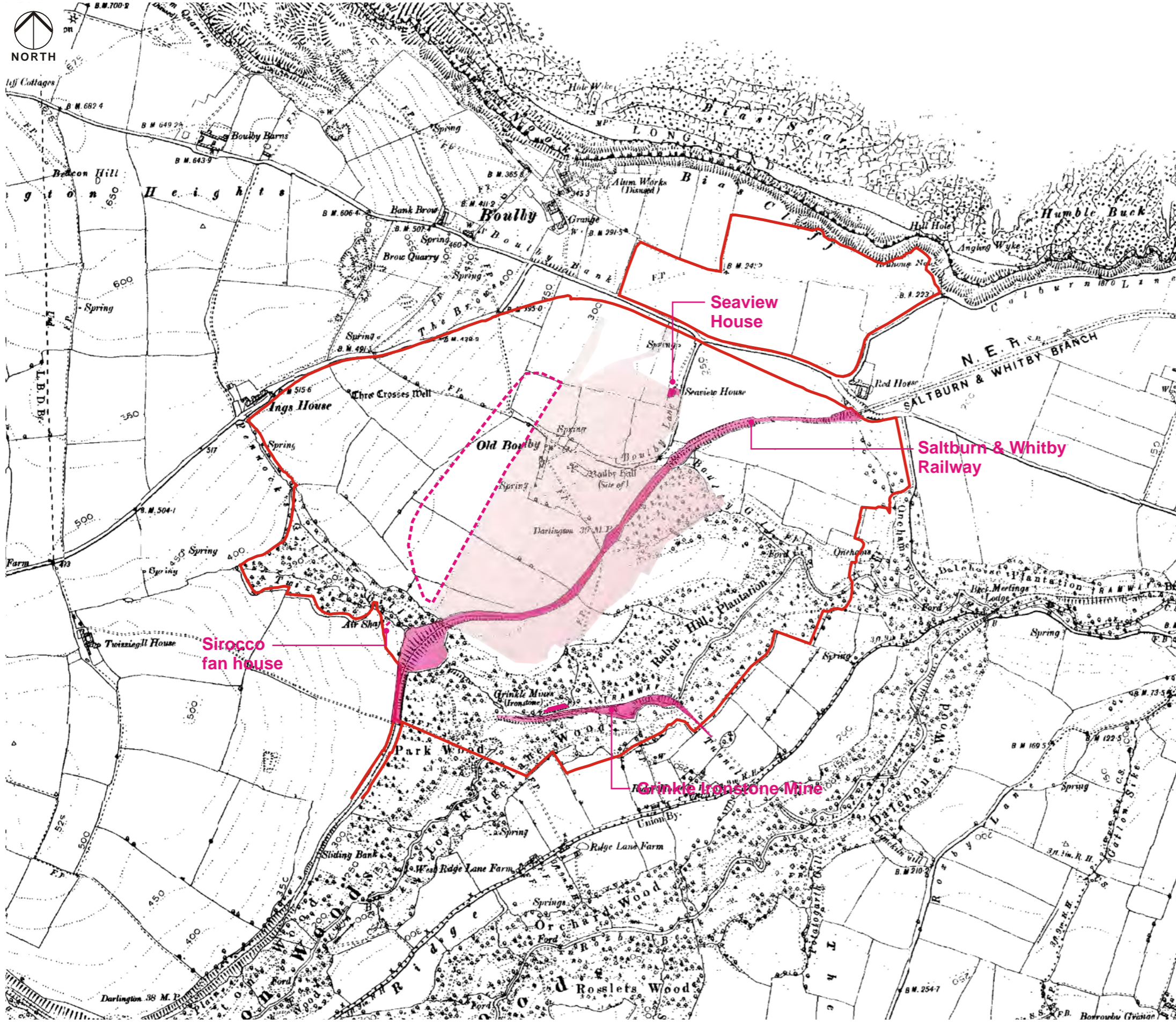


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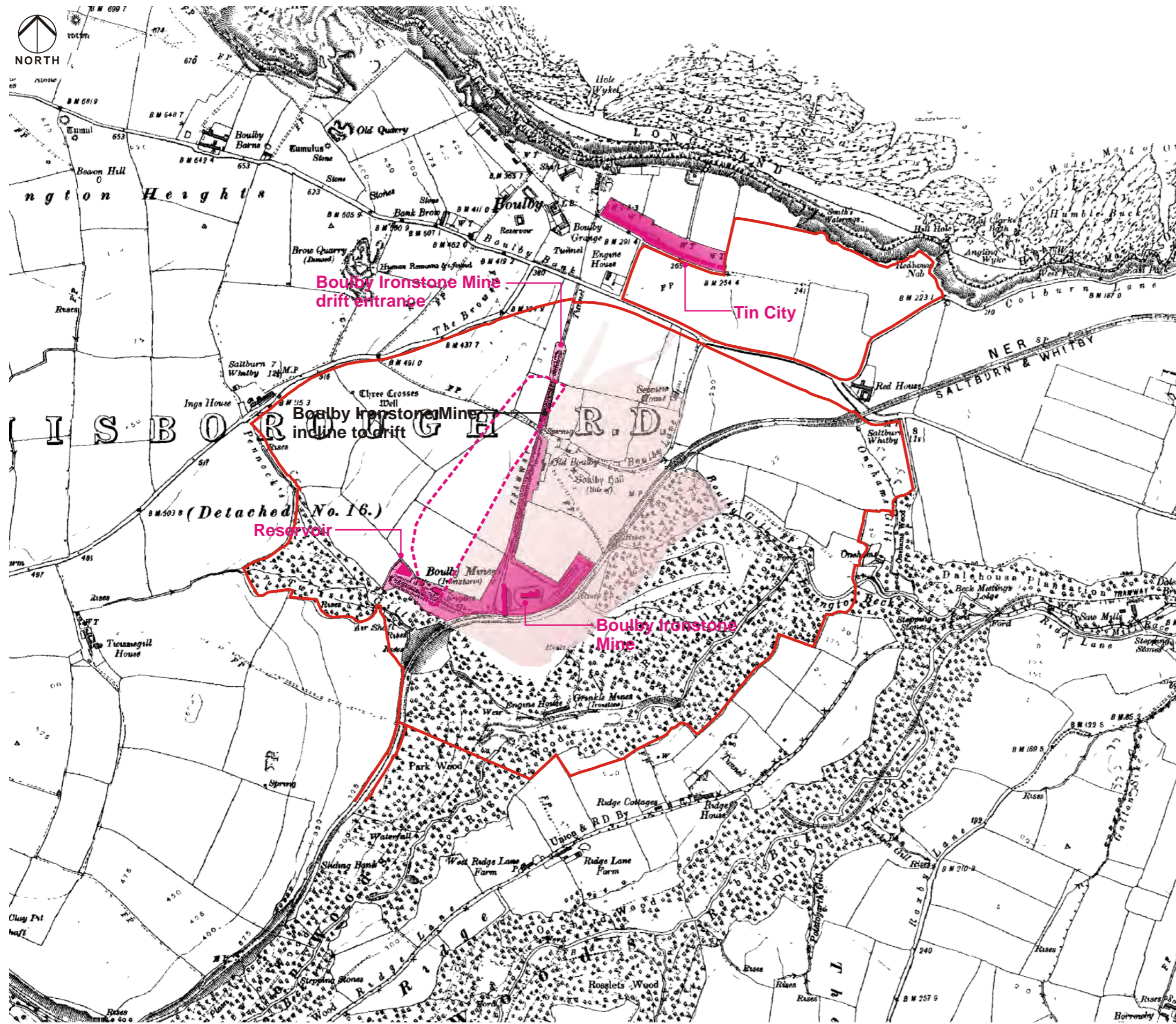
Figure 2274.11
Historic Mapping
Development 1846 - 1863



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Figure 2274.12
Historic Mapping
Development 1889 - 1899



CLEVELAND POTASH
Logo: A green stylized arrow pointing upwards.

Royal HaskoningDHV
Logo: A blue star-like shape. Text: **Royal HaskoningDHV**, *Enhancing Society Together*

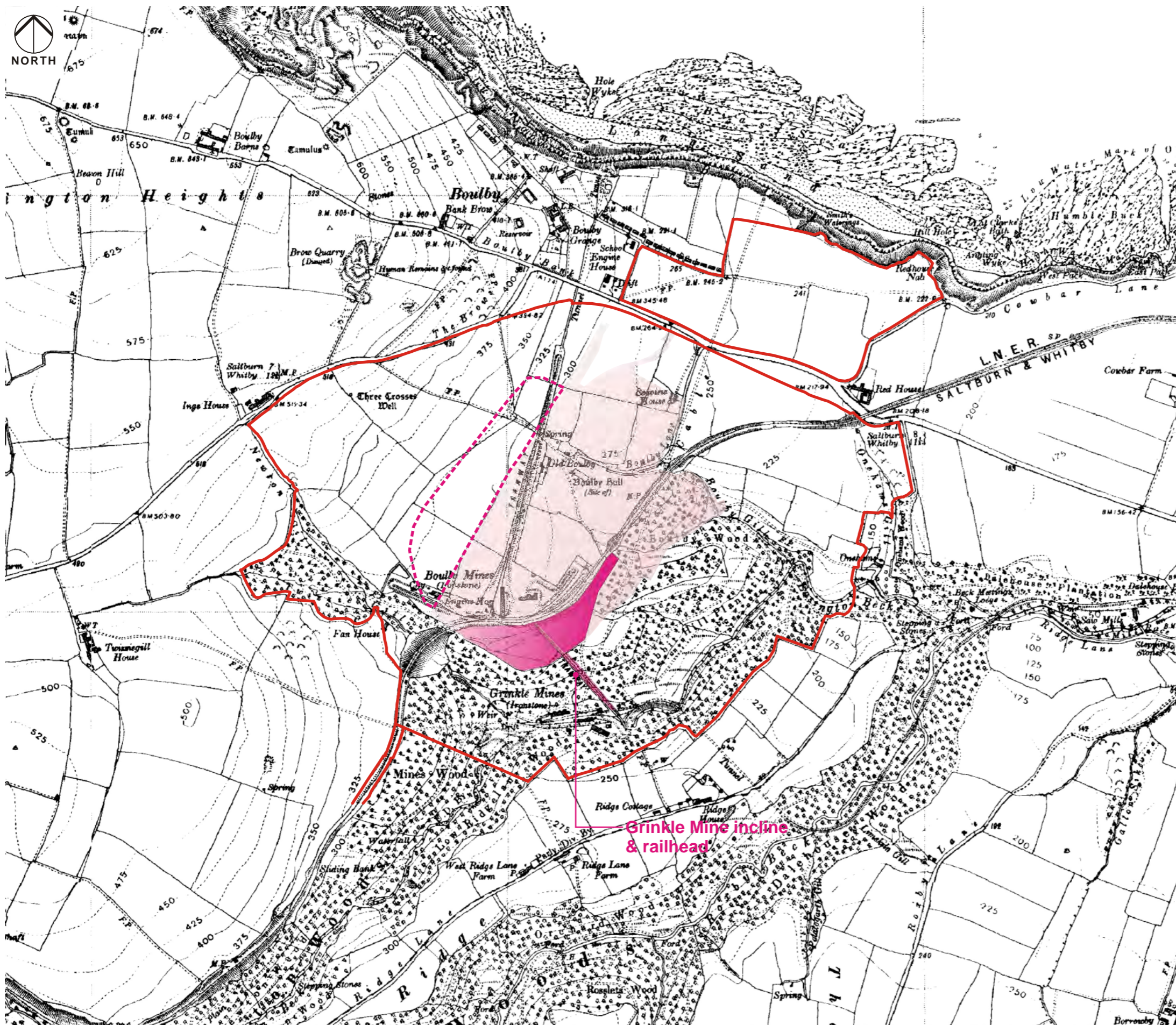
Estell Warren
Logo: A blue star-like shape. Text: **Estell Warren**, *Landscape Architecture*

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Figure 2274.13
Historic Mapping
Development 1907 - 1924



Note:

Incline and railhead were installed in 1916 but do not appear on available mapping until 1930-1954 sequence.



CLEVELAND POTASH



Royal HaskoningDHV
Enhancing Society Together

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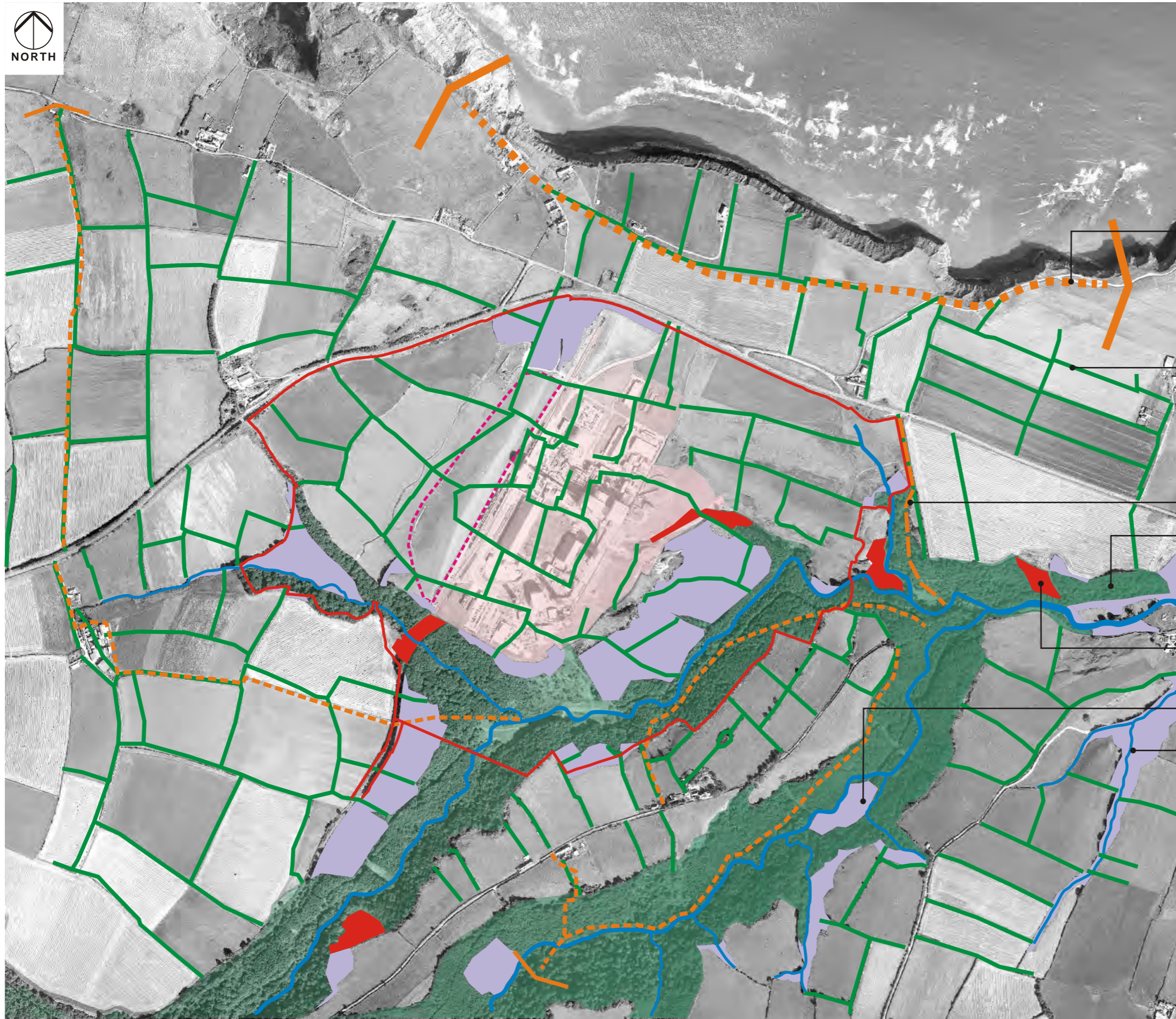
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Figure 2274.14
Historic Mapping
Development 1930 - 1954



- Cleveland Way
- 1846 field boundaries
- present day public rights of way
- 1846 woodland
- woodland removed since 1846
- woodland added since 1846
- watercourses



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Figure 2274.15
 Landscape Structure Template



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Figure 2274.16
Historic Features Template



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Figure 2274.17
Modern Features Template



Boulby Gill - landform to be retained, gill to be replanted as woodland with clearing along beck, surface water drainage to be returned to beck on closure of mine.



Existing woodland access track to be retained for long term management purposes.



An attractive ground flora has developed within existing woodlands. Future woodland management operations would encourage further species diversity.



Woodland understorey - to be managed for increased structural and habitat diversity.



Scrub (gorse, broom, bramble) encroachment at Grinkle Mine to be managed to create a balance between nature conservation and industrial heritage objectives.



Coniferous plantings to be managed out of woodland in the long term, in favour of native broadleaved species.



Wet flushes and wet woodland to be encouraged within existing woodlands and in new plantings on flatter land.



Existing public right of way network to be retained and enhanced, providing good links between the restored site and wider public access network.



Easington Beck, retained as existing



Site of former Grinkle Mine, looking west. Open character to be maintained as orientation point within woodland cover and to mark mine location.



Looking east to site of Grinkle Mine, access track to be retained as public right of way and for long term management purposes.



Encroaching bracken at Grinkle Mine clearing, to be controlled under long term management. Winding towers form an orientation point in woodland views.



Route of former Grinkle Mine incline, to be retained and used as new footpath route between Grinkle Mine and Potash Mine after restoration.



Remnant stone block foundations at Grinkle Mine, scrub encroachment to be managed and interpretation panel provided.



Grinkle Mine, remnant foundations.



Grinkle Mine, remains of concrete hopper.



Grinkle Mine - remains of substantial masonry retaining wall.



Remains of Sirocco fanhouse, west of Newton Gill



Junction of Twizzie Gill and Newton Gill watercourses.



Existing ditch north of screening mound, to be retained and reinforced with new hedgerow boundary along northern/ western edge. Eroded arable field boundaries to be replanted with new native hedgerow species.



Existing ditch spillway into Newton Gill to be retained.



Existing ditch north of screening mound, to be managed for nature conservation purposes, including sections to be fenced off from grazing access.



Existing ditch to be managed for wetland diversity, including excavation of deeper pond areas and adjoining marshy habitat.



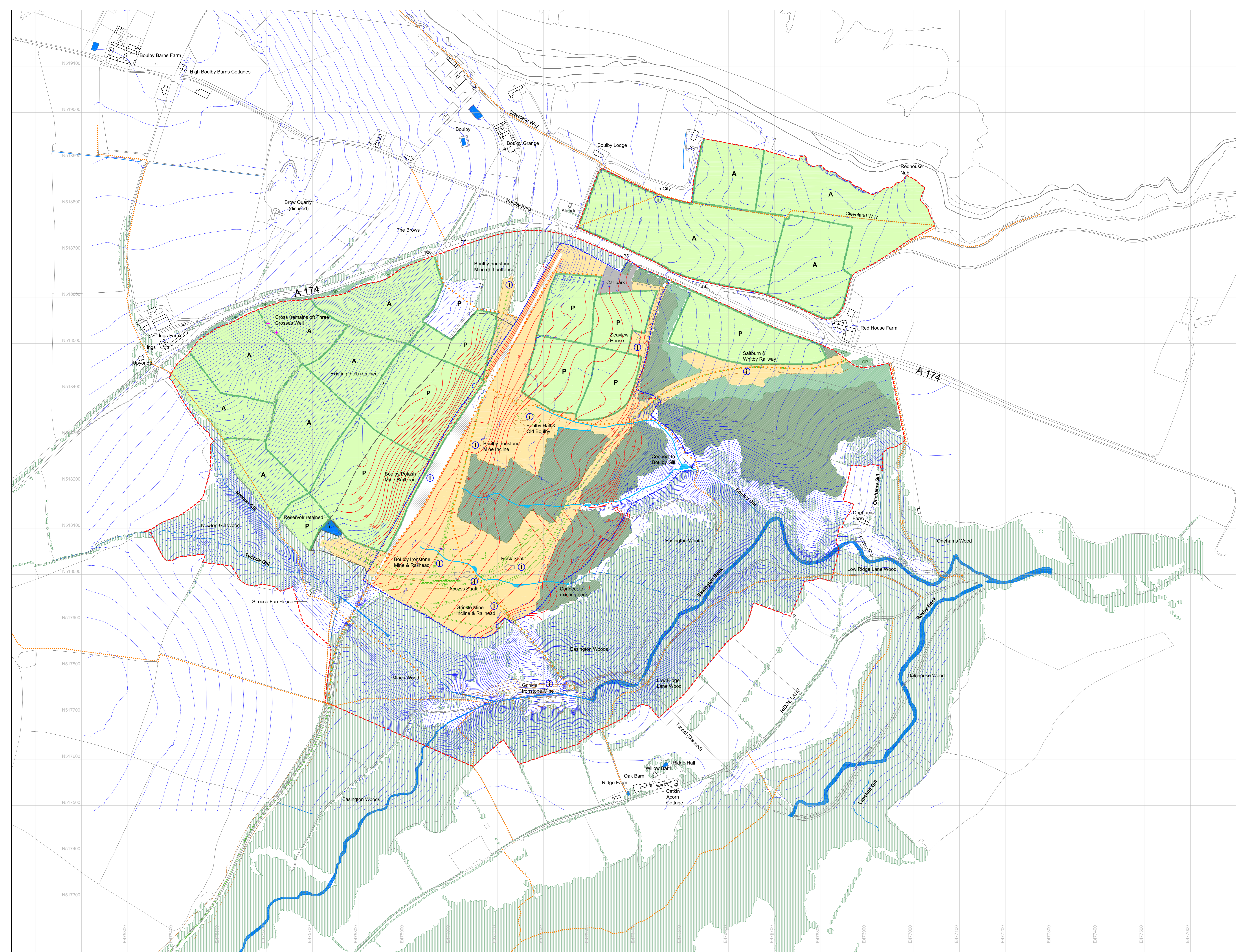
Boulby Ironstone Mine reservoir, to be retained as existing with stockproof fence surround and warning signs or remodelled with shallow edges as wetland habitat if long term public safety is a concern.



Twizzie Gill, to be retained as existing, including culvert under railway line.

Existing steep slopes and culvert under Grinkle Mine to be retained.





- KEY**
- Site boundary
 - Minehead area boundary
 - Northern screening mound footprint
 - Existing contours (1m interval within site, 5m interval outside of site)
 - Proposed contours (at 1m intervals)
 - Existing mixed woodland to be retained and managed
 - Proposed native broadleaved woodland
 - Proposed coastal scrub
 - Proposed native hedgerows (incorporating existing remnant hedgerows)
 - P Species rich pasture (to be managed by mixed grazing or cutting)
 - A Arable (existing fields retained)
 - Proposed wildflower meadow (to be managed by cutting and/or grazing)
 - OP Offsite planting by agreement (within highway boundary)
 - Proposed timber post and wire mesh stockproof fencing
 - Existing watercourses
 - Existing culverts to be retained
 - Proposed watercourses
 - Proposed wetland flush
 - Proposed earthwork mound to mark historic feature
 - Proposed earthwork ditch to mark historic feature
 - Existing winding house and shaft concrete foundations retained (note option to retain complete or partial winding towers)
 - Existing railhead track bed retained
 - Proposed car park (with access via existing highway connection to A174)
 - Existing public right of way (footpaths except where denoted 'I' for bridleway)
 - Proposed public footpaths
 - Site maintenance and farm access track (open to public access)
 - I Proposed interpretation signs
 - BS Existing bus stop

Rev.

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Client / Project:
**Cleveland Potash Ltd
Boulby Mine**

Drawing Title:
Restoration Proposals

Drawing Number: 2274.21	Revised: -
Scale: 1:2500 @ A0	Date: December 2012
Drawn: ME	Checked: SW

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