



**Mi SWACO**

A Schlumberger Company

**DUNTANLICH PROJECT PLAN**

## EXECUTIVE SUMMARY

The Project Plan for the Duntanlich Mine sets out a development scheme for the exploitation of a world class barite resource. Barite has been mined at Foss since 1985, but with increasing depth in this highly folded deposit, in tandem with reducing barite quality, the economics of mining this geologically complex structure are increasingly challenging.

Foss mine supplies some 42,000 tonnes of barite annually into the UK North Sea oil and gas industry, an industry which is critical to the supply of the UK's energy and chemical feedstock needs. Barite is an essential component of drilling fluids, its high density preventing "blowouts" during drilling operations. There is no substitute that has all of the properties of this mineral.

Politically there has been a growing recognition of the need for minerals which are used increasingly in our technological society and with it an awareness of the global distribution of these strategic minerals. Energy supplies are now to the forefront and policy direction is towards self-sufficiency and sustainability in energy and strategic minerals. A guaranteed, indigenous supply of barite to sustain drilling operations would be a major objective in achieving that aim. The proposed annual production of 120,000 tonnes of barite from Duntanlich would be a significant contribution.

In January 2012 M-I SWACO appointed Dalglish Associates Ltd to advance a scheme for the Duntanlich barite mine development. This Project Plan has evolved from consideration of the current site baseline and the overall feasibility of the development, informed by the then M-I Great Britain earlier and unsuccessful planning application in 1991, by subsequent M-I SWACO studies in 2000 and by Dalglish Associates' environmental studies undertaken over the period 2012 – 2014.

The 7.5 million tonne barite deposit at Duntanlich is a simple sub vertical, thick structure, of proven high quality, which will lend itself to mechanised mining methods. The 50 year life mine operation proposed will ensure continuity of employment for the skilled workforce from Foss Mine, which will be decommissioned and the mine area restored. The use of local suppliers and hauliers will be maintained.

Development options are constrained by the physical nature of the site. Situated within the National Scenic Area of Loch Tummel, landscape has been a major consideration in the Project Plan, informing the nature and scale of the mine site and the 14km of access track to the public highway. Other constraints on development have been identified and mitigation measures are embedded in the design principles of the Project Plan.

The Project Plan outlines the development principles to be taken forward in a comprehensive application for full Planning Permission, covering all site uses and activities.



North sea oil rig



The complex Foss Mine barite orebody



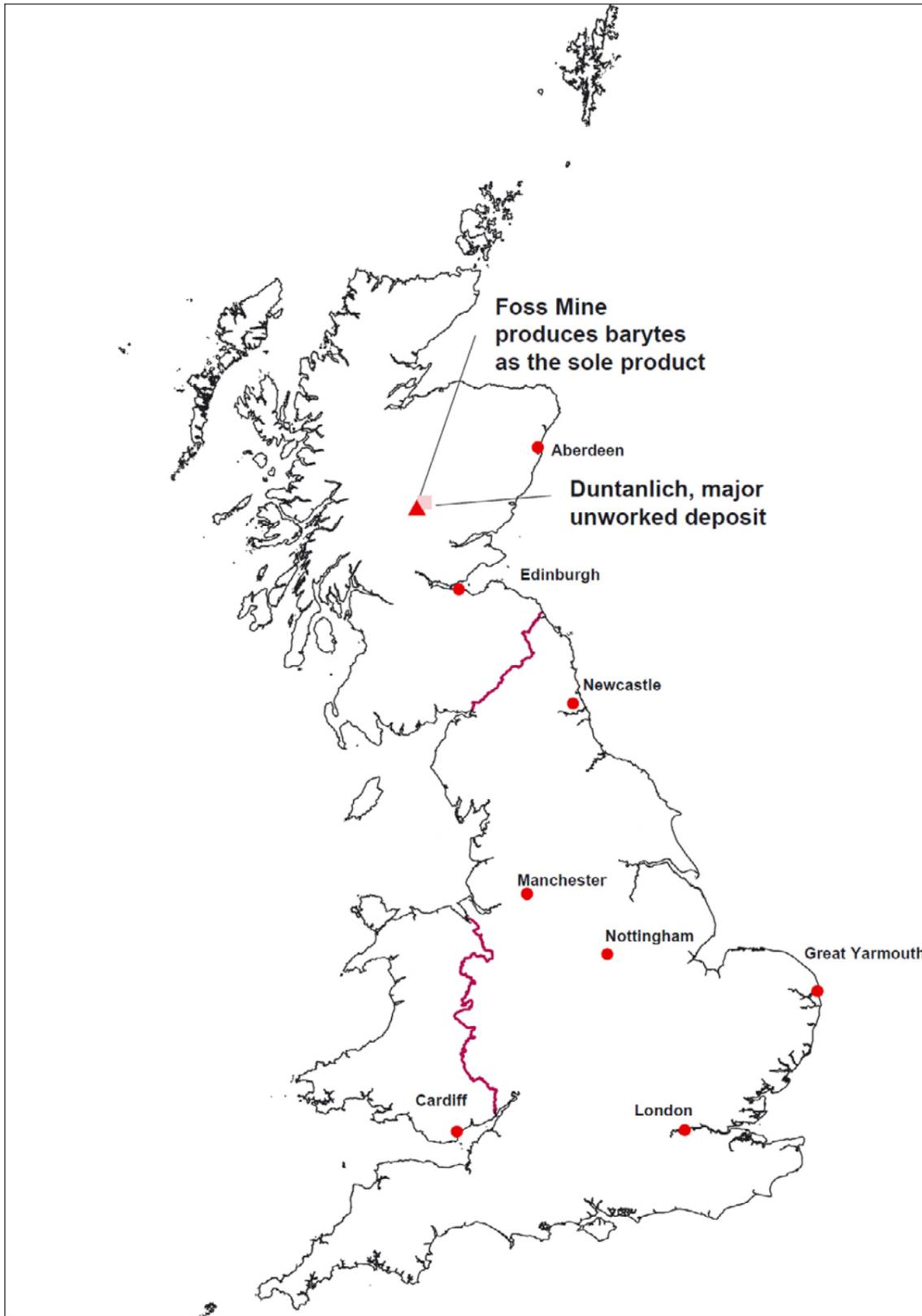
Hauling barite in Foss Mine

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Location of Duntanlich



Figure 1 Mine Site, Transfer Site, Borrow Pits, Access Track and Haul Road

# DUNTANLICH BARITE MINE PROJECT PLAN

## 1 INTRODUCTION AND BACKGROUND

### 1.1 Introduction

The Duntanlich Barite deposit is unique in the UK. This strategic development will enable the continued Scottish supply of barite into the UK North Sea Oil and Gas Industry. Barite, or barytes [barium sulphate, BaSO<sub>4</sub>] is essential for hydrocarbon exploration and consequently contributes to maintaining the UK's economically important oil and gas production. Barite acts primarily as a weighting agent to increase the density of drilling fluids, where it functions to confine high hydrostatic pressures due to oil, gas and water released by drilling and thus prevent "blowouts".

M-I SWACO Foss Mine, located to the north west of Aberfeldy, is a complex, folded deposit. Diminishing barite quality with depth and the inability to employ mechanised mining methods as a consequence of the geological structure, are placing increasing constraints on the economic viability of the deposit.

Exploration drilling into the barite outcrop at Duntanlich, on the northern side of the Farragon Ridge, identified a stratiform resource in excess of 7.5 million tonnes. A carefully designed underground mine, with a surface footprint under 1 ha, would be capable of delivering 120,000 tonnes of barite annually into the UK North Sea energy industry, decreasing critical dependence on foreign sources.

Issued in June 2014, the Scottish National Planning Framework 3, and the accompanying Scottish Planning Policy, recognise the importance of energy self-sufficiency and the contribution that mineral exploitation makes to the Scottish economy. Barite is an essential component in supporting UK supplies of oil and gas from the North Sea.

Currently annual production from Foss Mine is around 42,000 tonnes of barite. The operation provides employment for 18 men, supporting a further 30 employed by the locally based haulier, Barhaul, who crush the Foss mine raw barite production at their yard in Aberfeldy, before trucking the product to M-I SWACO operations in Aberdeen. Once milled in Aberdeen it is despatched by ship directly from Pocrá Quay to oil and gas platforms in the North Sea. Barite is also shipped from Perth Harbour to the mill at Great Yarmouth. Development of the Duntanlich barite resource will safeguard existing employment, increasing personnel to a total of 21.

The new Duntanlich mine, located below the Farragon ridge, nestles in a hillside bowl near the upper reaches of the Middleton Burn. It has been designed to be hidden from key viewpoints, respecting the sensitivity of the popular Queen's View at the eastern end of Loch Tummel.



A dedicated access track will lead eastwards from the mine site, crossing the Farragon Ridge into afforested land, ultimately descending to the transfer site, which will be located within trees to the north west of King's Stables car park. At the transfer site, barite ore crushing operations will be undertaken, fully enclosed to minimise noise and to control particulate emissions. Crushed barite will be taken from the transfer site by road haulage vehicle, with the final stretch of access road traversing the agricultural land to the north east of Logierait, before descending the river terrace behind Ferry Cottage, to access the A827 700m to the east of Logierait. The route to Aberdeen is then east to the Ballinluig grade-separated junction, onto the A9 and subsequently the A90 via the Broxden Roundabout at Perth.

The Project Plan embodies a Statement of Design, which aims to deliver in the short and medium term an operational facility sympathetic to its surroundings, with longer term landscape benefits in the restoration of the Foss Mine site, following its closure.

### 1.2 Background

A major Institute of Geological Sciences geochemical mapping project, the Mineral Reconnaissance Programme, was undertaken over prospective areas of the UK in the 1970s and early 1980s. The Foss barite deposit was first identified in 1976, pan concentrates from stream sediment sampling showing anomalous concentrations of barite. Follow-up geological mapping and geochemical analysis revealed that the source of the barite was a major stratabound deposit in folded Pre-Cambrian metasedimentary rocks.

Post publication of the Mineral Reconnaissance Programme report in 1979, Dresser Industries acquired leases over the wider area. The mining potential of the Foss Property was evaluated by drilling and trial drifts, with the mine being operated from 1985 by M-I Great Britain. Associated with the Foss Mine are a number of small former open pits, which extend some 300m from the mine entrance.

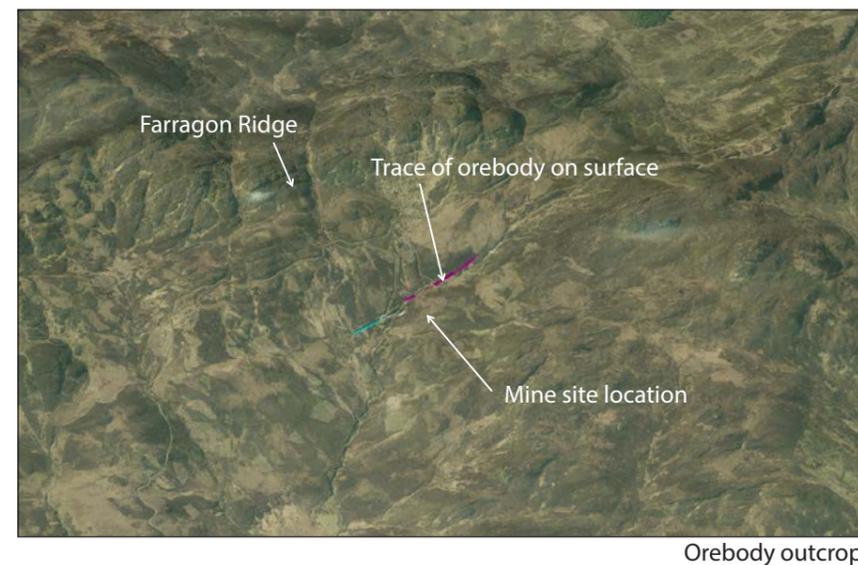
Further eastward, along the strike of the host formation, the Ben Eagach Schists, the Duntanlich barite deposit was discovered. Unlike the Foss deposit, which is a complex folded structure, the Duntanlich deposit is a simple, sub-vertical sheet like structure, contiguous with the surrounding metasedimentary rocks. The barite deposit was investigated by drilling, to prove its extent and quality, with a trial adit into the orebody being undertaken in 1987.

The orebody comprises a central barite layer, varying from 5m – 13m in thickness. On either side of this pure deposit is a carbonate-barite rock, which is in turn sandwiched between a barium enriched chert of variable thickness. The cherts contain traces of base metal mineralisation – galena and sphalerite.

The success of the exploration phase led to the preparation of a planning application to mine the deposit at Duntanlich. The application was submitted to Perth and Kinross Council in 1991 but was refused in October 1992. In 1994, following a Public Inquiry, a planning appeal by M-I Great Britain was dismissed and a subsequent Court of Session appeal in 1996 was also unsuccessful.

Key issues at appeal were variously:

- Impacts from the development on landscape and visual amenity within and outwith the National Scenic Area, in particular from Queen’s View
- Impacts on the local road network from barite transport to Aberdeen via a cross country route
- Concerns regarding surface and groundwater quality, the latter with respect to private water supplies in Strathtay
- Effects on the natural environment long term – inadequate restoration proposals and mine closure plans



Orebody outcrop

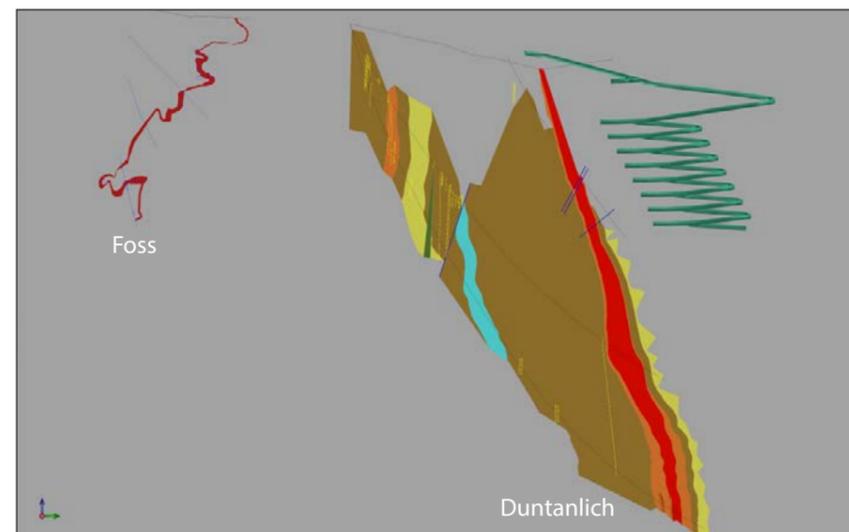
In 2000 an alternative scheme was devised to address those key issues and a request for a scoping opinion submitted to Perth & Kinross Council. However there was no change to the proposed access onto the A827 at Ballechin, some 3km west of Logierait.

As a consequence of the request for a scoping opinion, the proposals entered the public domain. M-I SWACO entered into successful discussions with the communities in Strathtay and Strathtummel, resolving concerns about private water supplies on the northern side of Strathtay and examining their concerns about access to the A827 through Ballechin. A proposed route avoiding the A827, with direct access onto the A9 at Pitlochry, was turned down by Transport Scotland. With access unresolved, M-I SWACO did not pursue their 2000 proposals.

### 1.3 Economic Considerations

Underground mining is an operation requiring appropriately skilled personnel. Since the opening of the Foss mine employees have been sourced from within the local community, with senior management based also at M-I SWACO Aberfeldy office and resident in the area. The mining operation is very much part of the local community, as are the crushing and haulage operations it supports at Barhaul.

- barite mining is a non-seasonal [tourism] component of the local economy
- existing local skills base – continued employment
- similar drive time for employees – east on the A827, rather than west on the B846
- continued use of established local support services
- shorter road haul route – economic benefits
- maintenance of the M-I SWACO milling operation and oil rig service operations in Aberdeen and Great Yarmouth



Foss and Duntanlich orebody cross sections

## 1.4 Private, Public and Community Interests

### 1.4.1 Landownership and access agreements

“Minerals can only be worked where they occur.” The mine site and some 4.5km of access track are in the ownership of Pitlochry Estates. The central section of the access track, together with two small potential borrow pit locations are within Forestry Commission land. The remaining section of access track and the transfer site and haul road lies within Atholl Estates landholding. Ferry Cottage and the adjacent land with an existing access to the A827 is also owned by Atholl Estates. M-I SWACO has concluded agreements with all landowners, including a purchase option on Ferry Cottage, to which the Company’s Aberfeldy office would relocate.

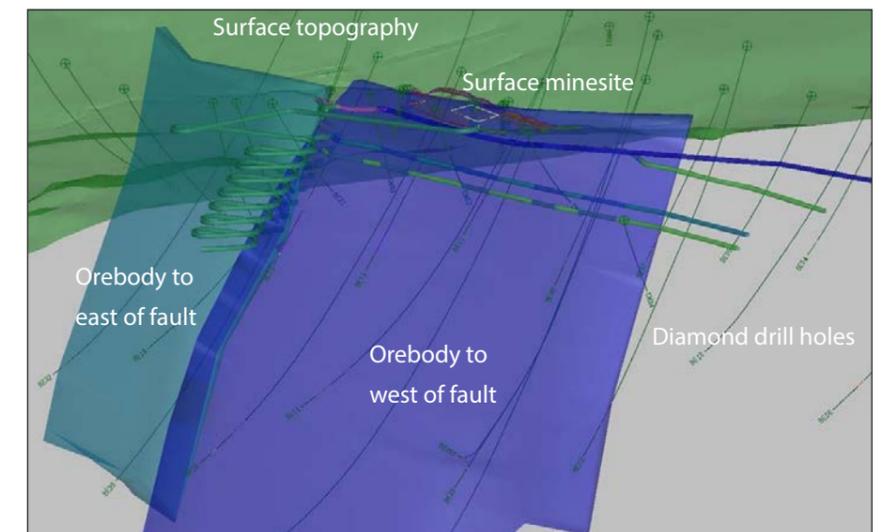
Landownership interests are illustrated on Figure 2.

### 1.4.2 Public Interests

Public interests relate to the continued support, from an indigenous barite resource, of the UK North Sea oil and gas industries, on which the UK is energy dependent.

### 1.4.3 Community Interests

The local community currently benefits from direct employment at the Foss Mine and associated barite crushing and haulage. M-I SWACO also uses local services.



3D model of orebody



Early development at Foss Mine



Barite crushing at the Aberfeldy yard



Shiploading of crushed barite at Perth Harbour for Great Yarmouth

Barite milling at East Tullos, Aberdeen



Milled barite loading operations at Aberdeen



Oil and gas rig drilling fluid handling unit



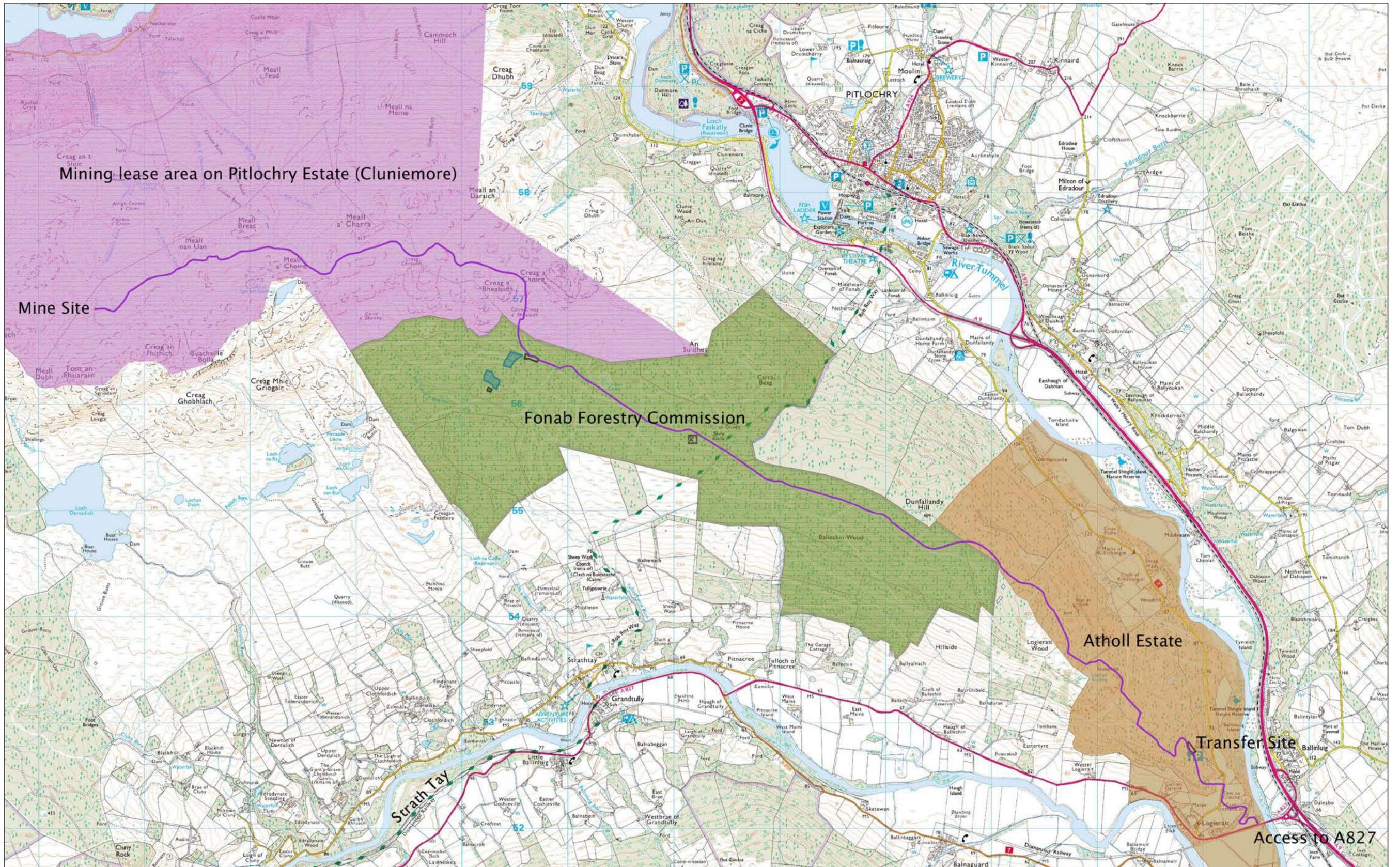


Figure 2 Landownership

## 2 PLANNING POLICY - THE DEVELOPMENT PLAN

### 2.1 Background

The Development Plan covering this area of Highland Perthshire comprises the Strategic Development Plan, the TAYplan 2012, with a 20 year time horizon, and Perth & Kinross Council Local Development Plan 2014 [P&KLDP], which looks to the next 10 years. The latter replaced a series of older Local Plans.

Consultation for the Scottish National Planning Framework 3 [NPF3] and the associated update to Scottish Planning Policy [SPP] commenced in the latter part of 2012, with the NPF 3 and SPP being approved in June 2014.

NPF 3 built upon the March 2011 publication by the Scottish Government of “A Land Use Strategy for Scotland”, a strategic framework bringing together proposals for getting the best from Scotland’s land resources and setting out the principles for sustainable land use, which are embedded in the policies of the very current Perth & Kinross Council Local Development Plan, adopted in February 2014. The adopted Local Plan has benefited from the latter stages of consultation on the SPP, with which it is aligned. The Local Plan sets out:

- the vision and objectives for Perth & Kinross – the Duntanlich development lies within the Highland Area
- development principles and clear policy guidance for development of all types [including Supplementary Guidance]
- spatial strategy

### 2.2 Local Development Plan – Strategic Environmental Assessment

Strategic Environmental Assessment of the Local Plan was undertaken over the period 2010 – 2012, with two addenda to the initial Local Development Plan Environmental Report prior to its adoption. An SEA post adoption Statement setting out how these reports informed the development of the Local Plan will also be issued.

The Strategic Natural and Cultural Heritage Constraints mapping informs the Duntanlich proposals. It highlights the National Scenic Area around Loch Tummel, which includes the Queen’s view, also land above 600m, both of which have been key considerations in the layout of the development with respect to landscape impacts and visual amenity.

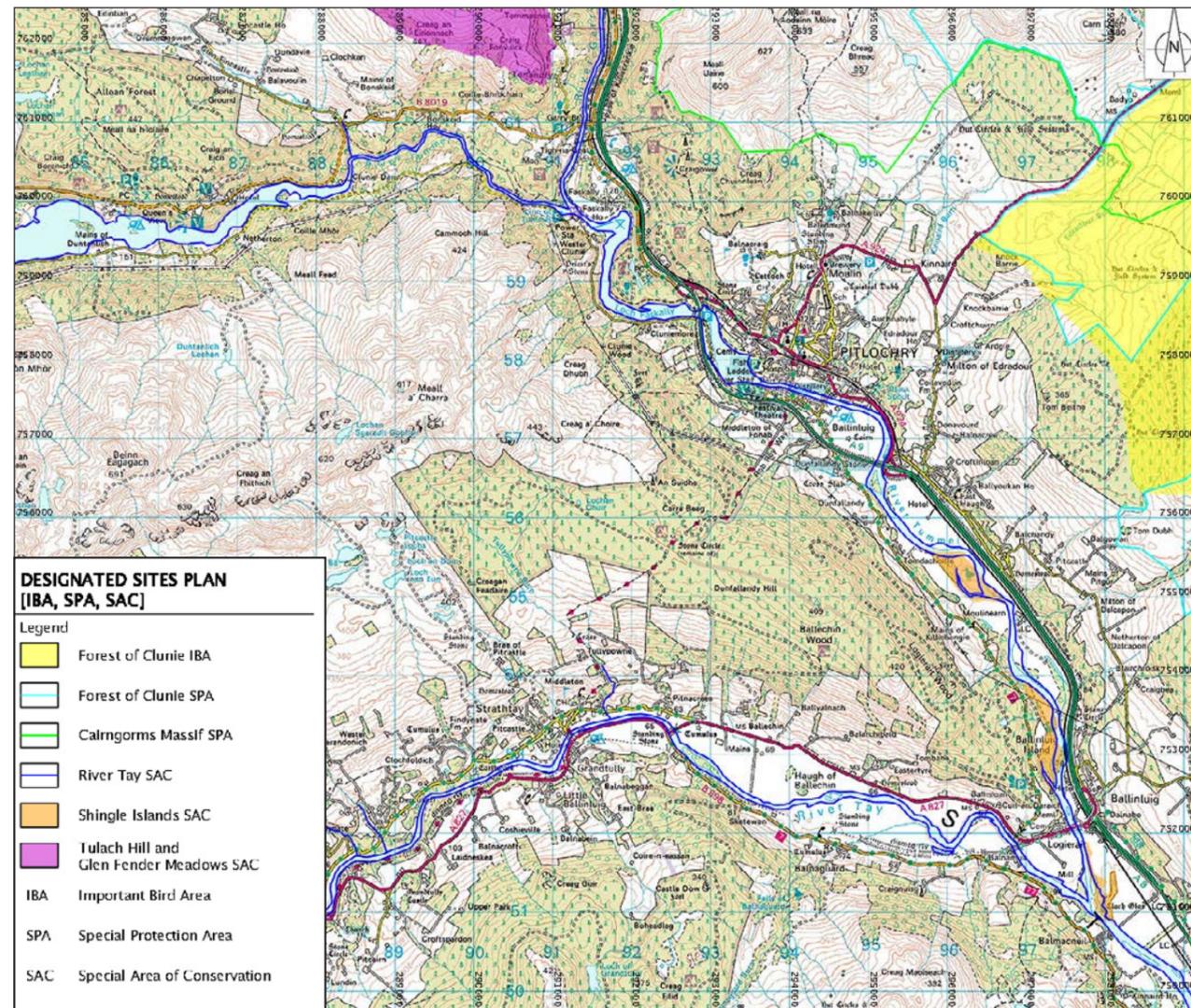


Figure 3 Constraints

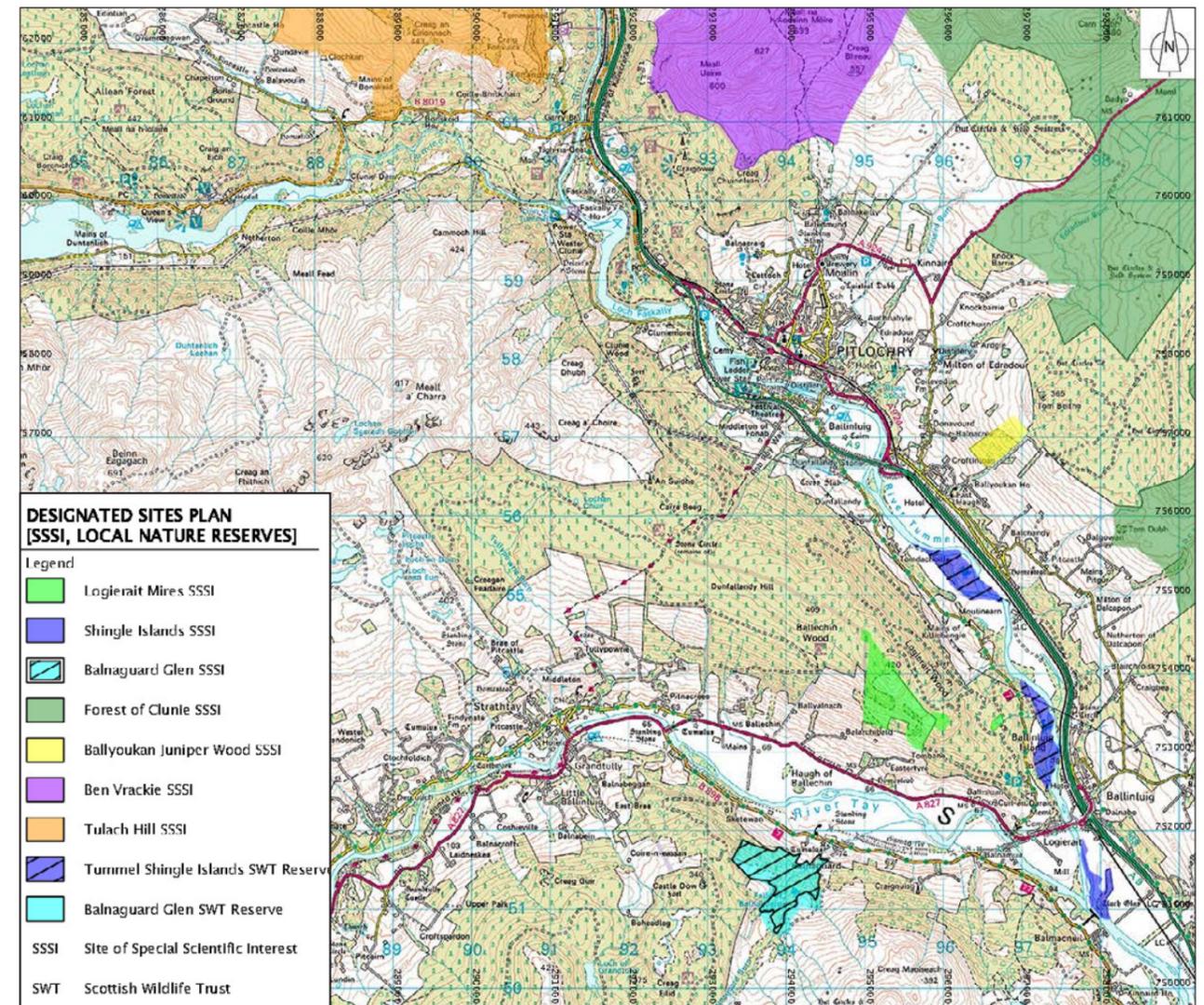


Figure 4 Constraints

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The extensive River Tay SAC is recognised, as are other sites designated for natural and cultural heritage interest and qualities.

With respect to the Duntanlich proposals, the Cumulative Strategic Sensitivities and Development Pressures mapping is topographically dominated with cultural heritage constraints identified at the southern extremity of the development.

### 2.3 Perth & Kinross Council Local Development Plan

The vision and policies set out in the P&KLDP covering the period to 2024 will:

- promote sustainable economic growth and sustainable development
- build upon the special qualities of the area
- recognise the importance of “place-making”
- protect Perth & Kinross’ most valuable assets

The vision for the economy – a flourishing and diverse local economy - will be implemented, inter alia by:

- providing the framework to increase the economic sustainability of Perth and Kinross by maintaining and providing locally accessible employment opportunities
- providing a flexible policy framework to respond to changing economic circumstances and developing technology

This vision must however take cognisance of “place”, by protecting and enhancing the cultural and historic environment and the character, diversity and special qualities of the area’s landscape to ensure that development can be accommodated. The protection, conservation and enhancement of habitats and species of international, national and local importance is an important part of that vision.

At the heart of the P&KLDP strategy is sustainable economic growth and its policies seek to achieve that objective.

The Duntanlich Barite Mine proposals have been guided by the P&KLDP, its policies and Supplementary Guidance.

### 2.4 Cairngorms National Park

The Cairngorms National Park was established in 2003, covering the Cairngorm mountain range and the hills surrounding. In 2010 the Park expanded into Highland and into Perth and Kinross. Its boundary in Perth and Kinross extends southwards to the A9, at Blair Atholl and encompasses the high mountain range of Beinn a’ Ghlo, with its individual peaks, all Munros, and the Munro of Beinn Dearg. Although at distances of 15km and greater, the Farragon Ridge and the mine development are potentially visible from these high peaks and viewpoints from within the Cairngorm National Park have therefore been considered.

### 3 SITE DESCRIPTION

#### 3.1 Current land uses and activities

##### 3.1.1 The Mine Site and access track from Fonab Forest

This area, below and on the north side of the Farragon Ridge, is upland heath and is used by Pitlochry Estate for limited sporting purposes. The upper part of the moor is at an elevation of 500 – 550m.

Existing estate development is limited to a hill track leading from Nethererton, on the south shores of Loch Tummel, to Duntanlich Lochan, then to the lower slopes of the Farragon Ridge, before ascending over the southern shoulder of Ben Eagagach to the south of the mine site.

At the mine site, the trial adit into the barite deposit is visible on the western flank of the Middleton Burn.

##### 3.1.2 Fonab Forest

In the ownership of the Forestry Commission Scotland and operated by Forest Enterprise Scotland, much of Fonab Forest is of felling age, with large areas on the southern side of Dunfallandy Hill, above Ballechin, having been clear felled.

The central portion of the mine access track is located within Fonab Forest and utilises existing forestry tracks, or will be created within forest rides, in the upper part of the forest, at elevations around 350 – 360m AOD.

##### 3.1.3 Logierait Woods and Killiechangie Woodland

The penultimate and southeastern part of the access track and the transfer site [130mAOD] are located within Logierait Woods and Killiechangie Woodland, owned and managed by Atholl Estates. Mainly coniferous, with stands of silver birch, the woodland includes walking and bike trails which commence at the car parking area at King's Stables. The woodland management scheme includes both coniferous and mixed woodland. Currently felling has taken place on the eastern flanks of the hill.

##### 3.1.4 Logierait Farmland and River Terraces

The final part of the access track, the haul road from the transfer site, emerges from Logierait Woods, crossing farmland and the unclassified road from Logierait to Pitlochry before descending the wooded face of a former river terrace to Ferry Cottage and the A827 at around 60m AOD.

The farmland supports a mixed but limited crop range, with grass leys predominant.



Saddle mire on the Farragon Ridge



Flush development on north side of Farragon Ridge



Looking towards headwaters of Middleton Burn

##### 3.1.5 Site watercourses and drainage

The Farragon Ridge and its eastern extension through Fonab Forest and Dunfallandy Hill forms a major catchment divide between Strathtay and Strathtummel.

A number of small streams flow steeply from their headwaters on the north side of the ridge directly into Loch Tummel. The Middleton Burn crosses the outcrop of the barite deposit and flows into Duntanlich Lochan where it is augmented by its tributary, the Allt Coirein a'Chinn. Its final descent to the foreshore of Loch Tummel is steep and within a rock defile.

Watercourses on the north side of the Farragon Ridge commence as seeps and flushes, noticeable by the change in vegetation.

The Middleton Burn, at the mine site, is a small watercourse, rising some 250m to the south west, on the saddle between Beinn Eagagach and Meall Dubh. The mine site will occupy a small bowl, with the Middleton Burn beyond its south eastern boundary.

On the southern side of the Farragon Ridge, the drainage pattern is more complex, with a number of lochs and lochans occupying the undulating plateau below the ridge, some of which give rise to the larger streams on the Strathtay side of the catchment divide. Small saddle and valley mires have been noted across the Ridge.

##### 3.1.6 Current Access

The mine site may be reached by vehicle from the Nethererton Track. A short length of track spurs off to the location of the trial adit. From that point access is on foot.

##### 3.1.7 Transport Links

The existing access at Ferry Cottage onto the A827 is some 270m from the roundabout at the slip road from the northbound A9. Access to the A90 to Aberdeen is taken at Broxden Roundabout at Perth.

##### 3.1.8 Adjacent Land Uses

Adjacent land uses are shooting estate, forestry and farming. In the more elevated part of the area, recreational use is limited to hillwalkers on the Farragon Ridge or on the core path of the Rob Roy Way, which crosses from Strathtay to Strathtummel, partly through Fonab Forest.

At the southern end of the site, the transfer site and haul road lies within the lower part of Logierait Woods, where Atholl Estates have created forest walks and a cycle track. Logierait Cemetery is located about 210m to the west of the haul road, at its closest point. The settlement of Logierait is located 300m to the south west of the haul road, as the crow flies.



Mine site access track and borrow pit locations



Looking west towards to Ben Eagagach and Farragon Hill with the proposed mine site in centre middleground

Looking east to Fonab Forest descending from the Farragon Ridge



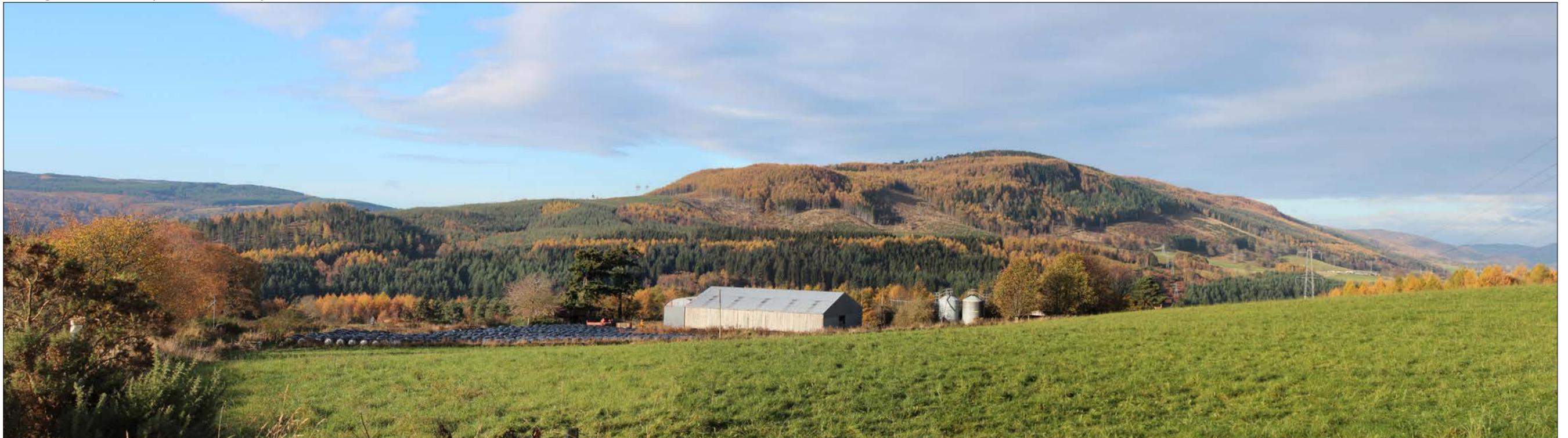


Mine site access track, transfer site and A827 access



Transfer site and crossing point on unclassified road north of Logierait

Looking west from Balintyler to Dunfallandy Hill and transfer site location (within woodland)



## 4 SITE APPRAISAL

### 4.1 Development remit

The commercial exploitation of the barite resource presents a number of physical challenges. These are:

- the elevation and remoteness of the barite deposit
- a requirement for a level area for the mine site, portal and ancillary infrastructure
- no existing access across moorland from the Fonab Forest boundary
- incomplete access through Fonab Forest and Logierait Wood
- a level area in which to locate the transfer site
- access to the main highway network avoiding settlements

The physical requirements have to be satisfied within the context of environmental and amenity constraints, which are the subject of the policies of the development plan.

### 4.2 Approach to the appraisal

Having established the parameters for the mine development with M-I SWACO, an appraisal of the context and physical characteristics was undertaken, comprising desk based studies and site surveys. The studies have taken place over a three year period [2012 – 2014] and include the following:

- review of background reports and data
- review of the 1991 environmental studies and planning application
- review of the scoping request submitted to Perth & Kinross Council in 2000 and responses from the Council and SNH
- identification of major physical constraints to the development
- identification of the key elements of the development
- examination of the site development alternatives
- environmental mitigation – construction, operation and mine closure
- infrastructure requirements

### 4.3 Background reports and consultations

In addition to NPF 3, SPP 2014 the Development Plan and related Supplementary Guidance, key documents and consultations referred to in preparation of the Project Plan include:

- SNH Designated Sites citations
- SNH commissioned report: Land Use Consultants 1999 Tayside landscape Character Assessment [SNH Report No. 122]
- SNH 2010 The special qualities of the National Scenic Areas [SNH Report No. 374]
- SNH and CNPA 2010 The special landscape qualities of the Cairngorms National Park [SNH Report No. 375]
- SNH 2007 Assessing the Impacts on Wild Land Interim Guidance Note [currently under revision; October 2014]
- SNH 2013 Core Areas of Wild Land [Map]
- Historic Scotland 2012 [confidential discussions on the archaeological heritage of the development areas]
- SEPA 2012 - provision of historical data and baseline monitoring requirements
- M-I SWACO - historical planning and environmental information
- Dalgleish Associates – baseline ecological and hydrological surveys and analysis
- Dalgleish Associates – peat probing and peat analysis
- Dalgleish Associates – peat hazard and slide risk assessment
- Dalgleish Associates – landscape criteria review and visual assessment analysis



Winter conditions at 720m en route to Foss Mine



Snow clearing on the Foss Mine track



Duntanlich Mine site at 495m

#### 4.4 Site context

The site elements are essentially a small mine site, linked by 13.9km of access track to the transfer site, then by a 1.3 km haul road to the A827. An electricity supply will be taken from the substation on the south side of Loch Tummel to the mine site via the Nethererton track. The supply will be by underground cable.

#### 4.5 Site structures

##### 4.5.1 The Mine Site platform and portal

The mine site platform is under 1ha in area and will require to be part excavated into the hillside to accommodate the mine portal and to provide adequate level area. The excavated material [rock and glacial drift, minor peat soils] will be formed into a landscaped mound, exaggerating the natural topography on the northern flank of the mine site area.

This level area will support barite ore storage bays, a workshop and separate office and welfare facilities for mining personnel. Contained within the mine site are water treatment facilities to control and treat site run-off and groundwater discharges from the developing mine.

The mine portal will have dimensions of approximately 4m x 4m and will be cut slightly into the excavated hillside slope, with concrete wing walls.

##### 4.5.2 Underground Mine

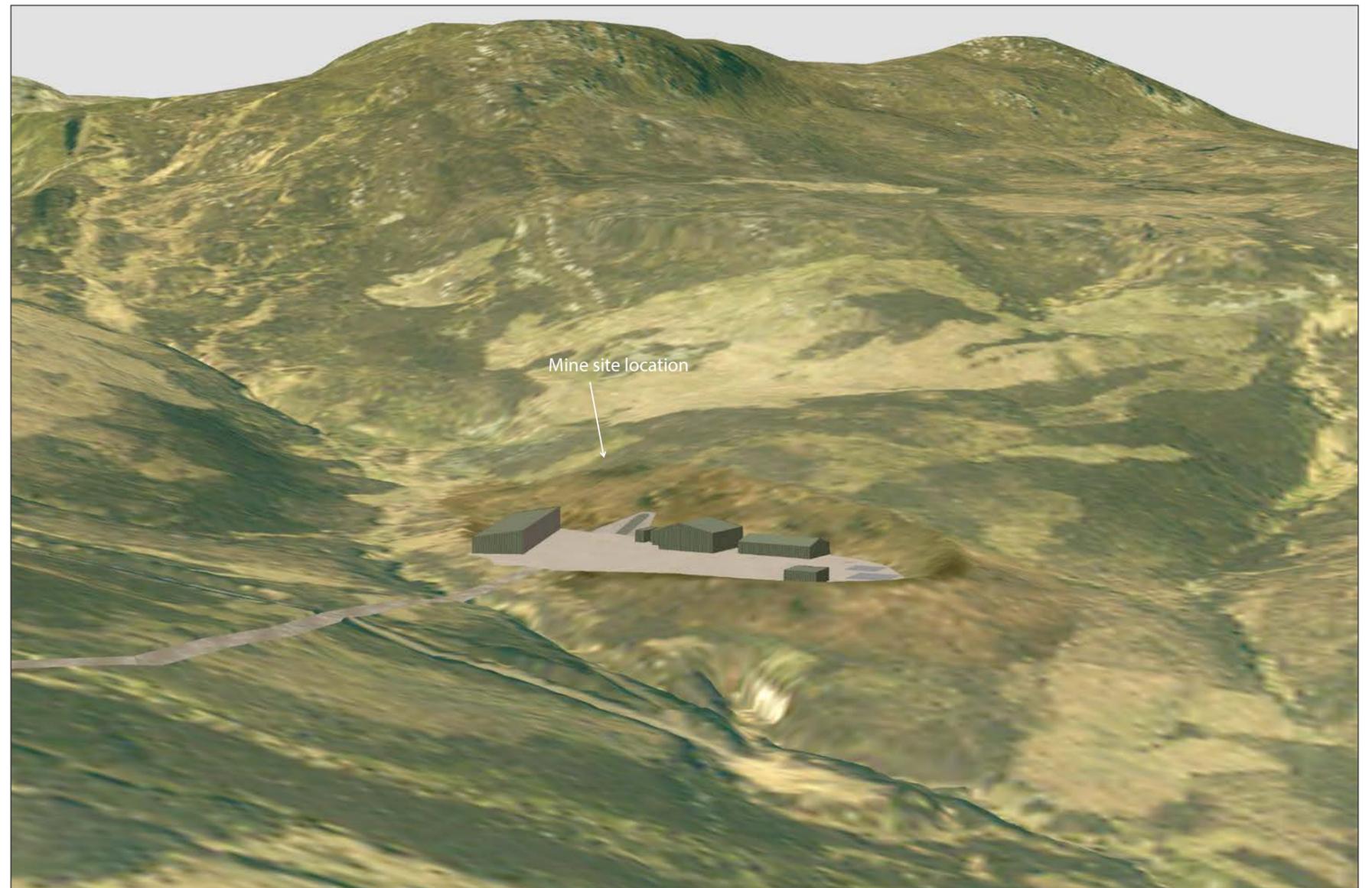
From the portal a spiral ramp will be created, with cross cuts to the orebody stopes. Rock from the ramp development can be used as part of materials balance for access track construction.

##### 4.5.3 Middleton Burn crossing

The Middleton Burn adjacent to the mine site is around 1m in total width and of similar depth, incised into the surface peat soils and underlying glacial drift. The stream will be bridged to enable access to the mine site.

##### 4.5.4 Access track to the Transfer Site

The access track will be a nominal 5m width. A major consideration in the siting of the access track was the minimisation of those parts of the track within the National Scenic Area [NSA] and potentially visible from sensitive receptors at the Queen's View, while avoiding flushes supporting possible groundwater dependent habitats and areas of deeper peat [ $>0.5\text{m}$ ].



LSS model of site

Once across the Farragon Ridge and out of the NSA the access track enters Fonab Forest, where existing forestry tracks will be used, new track only being created within forest rides, where landscape and visibility constraints apply.

Similar constraints apply within Logierait Woods and Killiechangie Woodland, in the adjoining Atholl Estate.

##### 4.5.5 Borrow pits

Aggregate is required for the access track, which will be constructed to standards set out in wind farm construction guidance. A suitable source of metabasite rock and of glacial sands and gravels has been located within the western part of Fonab Forest close to the access track.

#### 4.5.6 Transfer Site

Barite ore will be transported from the mine site by ore truck to the transfer site in Logierait Woods for crushing and for onward transport to the milling operation in Aberdeen and to Perth Harbour. The crushing operation and barite stockpiles will be fully enclosed, contained within an acoustically clad, large, agricultural type building, to minimise noise, particulate and light emissions. The building will be located in the lower part of Logierait Woods, where a level area has been identified, requiring minor site levelling works and tree clearing, extending to around 0.45ha. Electrical power will be provided by generator.

#### 4.5.7 Haul Road to the A827, unclassified road crossing point and site access at Ferry Cottage

Road going articulated lorries will require the construction of a 6m wide haul road from the transfer site. Once leaving Logierait Wood, the haul road and vehicles will be visible for the final 600m to the A827 access, using the present access to Ferry Cottage. The haul road will cross the unclassified road due east of the southern tip of Logierait Wood.



Transfer site area



Access track in forest ride



Looking south from crossing point on unclassified road north of Logierait



Haul road location above Ferry Cottage



Looking east on A827 at Ferry Cottage



Looking north from above the access track route towards Beinn a' Ghlo

## 4.6 Site constraints

Physical constraints to the development of the site have been assessed as part of the development brief.

### 4.6.1 Flood risk

No flood risk to the development has been identified. The development itself will not give rise to a flood risk.

### 4.6.2 Engineering limitations

A requirement to upgrade parts of the forestry tracks, particularly within Atholl Estates, has been identified, including a main stream crossing. New construction includes steeper sections on the eastern flank of the hillside, in Killiechangie Woodland. Aggregates for the construction of the haul road from the transfer site

to the A827 may have to be brought to this part of the development from external quarry sources.

## 4.7 Environmental and Cultural Heritage Constraints

The greater landscape in which the development proposals are located contains a number of designated areas, illustrated in Figure 5.

### 4.7.1 Landscape

In this scenic location a full consideration of the landscape context is a pre-requisite to the development of the mine. The mine site and around 4.5km of access track across the moor lies within the Loch Tummel National Scenic Area. The SEA of the Perth & Kinross Local Development Plan also identifies land above 600m as sensitive, and where development should be avoided.

NSA special qualities relative to the mine development are:

- A breathtakingly beautiful landscape, both lowland and highland
- Loch Tummel, the heart of the NSA
- Rich and varied woodlands
- Peacefulness and tranquillity
- The celebrated Queen's view
- Spectacular and famous mountain gorge – the Pass of Killiecrankie
- The picturesque Linn of Tummel



Looking north west from above the access track route towards Loch Tummel

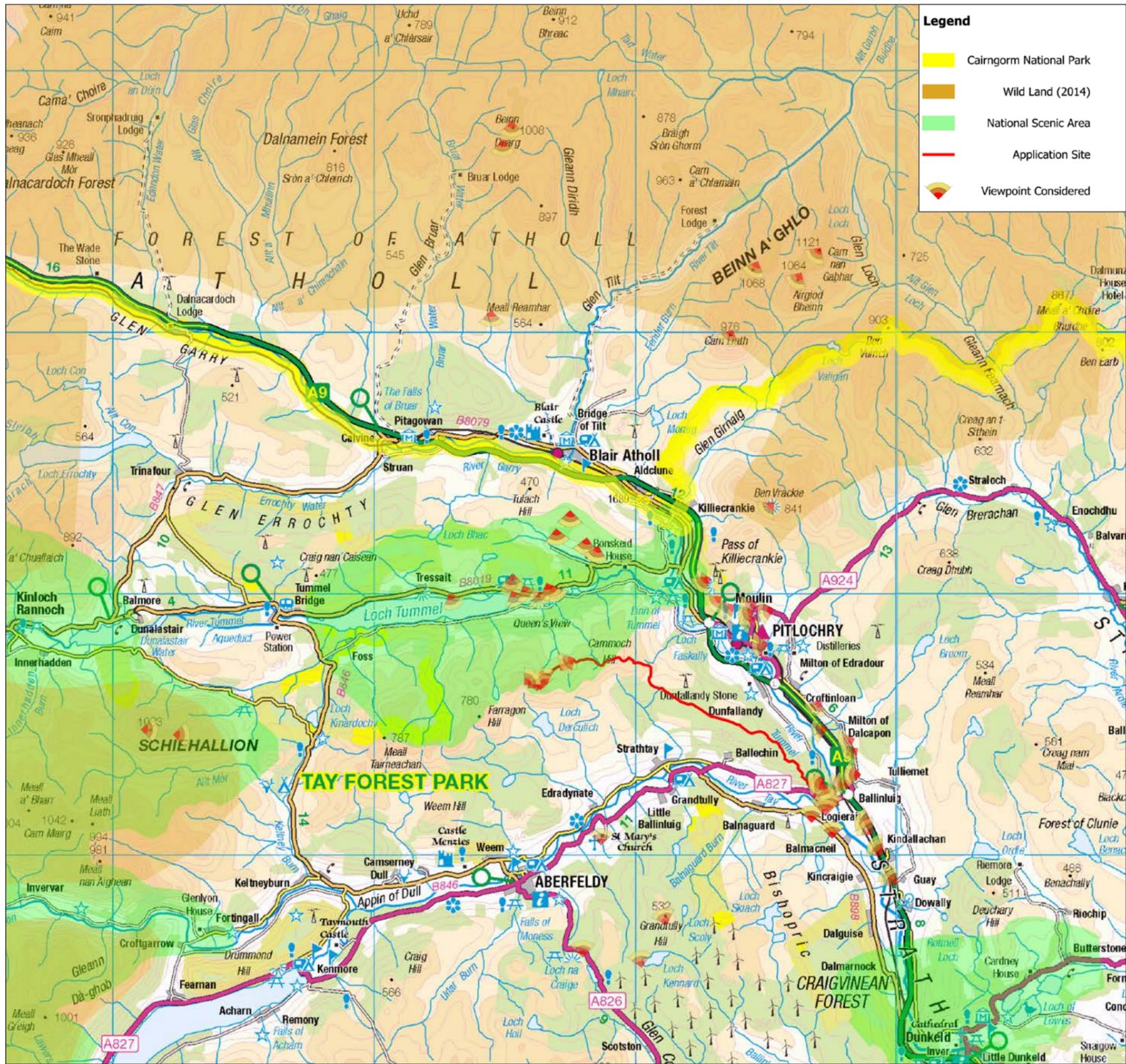


Figure 5 Landscape Designated Areas

Notably in the SNH 2010 Report the Tummel Valley is recognised as “dramatically differing from the stern straths of the north and the wild glens of the west. It is a breathtakingly beautiful wooded landscape containing a sparkling river and a stunning loch. It is a fertile lowland strath with a long history of settlement and prosperous looking houses and farms; and on the higher slopes there is a wilder landscape of rocky crags and bare, heather-clad summits. The long and narrow Loch Tummel beneath its rocky hills and wooded slopes, fills most of the floor of the strath. Presenting a tranquil aspect, the peaceful waters of the loch are the heart of the NSA”.

For the many visitors to the Queen’s view, it is this experience of tranquillity and the juxtaposition of the physical and historical landscape which must be considered in the development of the Duntanlich barite mine, despite the existing man-made influences of the electricity pylons and tourist development of the caravan site on the southern and northern loch shores respectively and of the commercial forestry plantations and operations that clothe the lower and middle slopes on both shores.

It is interesting to note that the characteristics of the landscape, from the high vantage point of the Queen’s view are noted to “draw the eye westwards through the strath of wood, pasture and rocky moor, over the shimmering waters of Loch Tummel to the distant hills: to the simple lines of the high peak of Schiehallion, and, on a clear day, as far as the great mountains of Glencoe low on the horizon”.

To maintain those experiential characteristics, the physical attributes of the mine development should intrude as minimally as possible. The mine site and track should not be visible from the Queen’s view. Indeed from locations, such as the recreational paths within Allean Forest, where more elevated views of Loch Tummel are obtained, the mine site should not be seen and potentially visible sections of the track minimised.

Permanent landscaping at the mine site should be undertaken sympathetically, to blend with natural surrounding landforms and to provide for habitat regeneration commensurate with that on adjacent land, to avoid impacts from vegetation colour contrasts. The mine portal finishes would relate in colour to rock outcrops in the area.

As few buildings as possible is preferable to avoid the “clutter” associated with disparate building styles and dimensions. Although functional layout of buildings at the mine site is important, in terms of visual amenity for walkers using the Nethererton Track to reach Ben Eagagach or the Farragon Ridge, buildings of a non-reflective finish and colour to blend with the backdrop of the hillside, should not be visually intrusive in the landscape.

Vehicle movements from and to the mine site have the potential to intrude visually and acoustically into the landscape experience from the Queen's view. To this end, no movements should be seen from that location and vehicle colour should be recessive and non-reflective. Potential acoustic effects are mitigated by distance and by noise sources closer to the Queen's view, for example, vehicles arriving and departing at the adjacent car park.

For over 9km of its route, the access track lies within forestry. Felling and restocking plans for both Fonab and Atholl Estate's forestry areas have been carefully considered in the access route planning.

Similarly containment of the crushing plant and barite stockpiles within a simple agricultural style building within woodland, in Logierait Wood, will avoid industrial clutter.

Lighting for health and safety purposes is unavoidable at an industrial site. Lighting requirements would be task led, with levels of illumination adjusted to meet requirements and lighting carefully directed to avoid glare and unnecessary light spill. Lighting design for the site as a whole, and, in particular, the mine site is an important factor in mitigating impacts on the landscape and effects on the astronomical "dark skies" resource.

#### 4.7.2 Ecology

Wetlands and peatlands are important UKBAP habitats. The Duntanlich Mine development is appropriately located to avoid those habitats, or to minimise potential impact on them. Mammals, birds and insects recorded across the wider area include European Protected Species and Red and Amber List species.

The Project Plan addresses potential habitat loss, the mine site being the primary consideration. The area is limited in size, under 1ha and has a similar habitat to much of the wider and adjacent area.

All development will be carefully managed to avoid impacts on biodiversity, as identified in the SEA, in the constraints mapping and from site surveys undertaken during the period 2012 – 2014, and which are ongoing. Where areas have been affected by former exploration work, there is a commitment to remediation and restoration of natural habitats, in particular priority heath and peatland habitats.



Looking west from the Queen's view



The Farragon Ridge from Allean Forest Viewpoint



Looking westwards from above Ballinluig to the transfer site location (centre field within woodland)



Figure 6 Natural vegetation classification (NVC) survey (western section of access track from mine site)

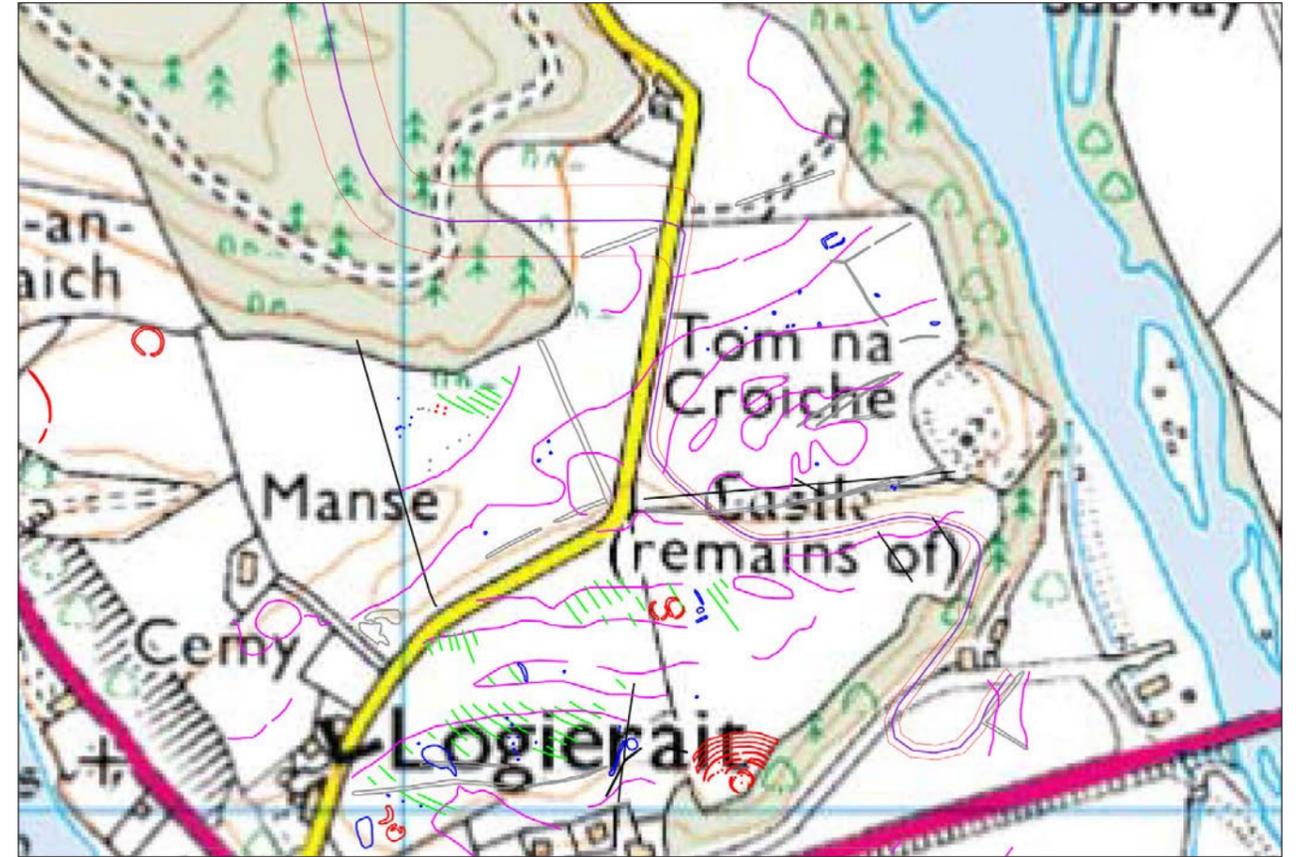


Figure 8 Haul road corridor, Tom na Croiche SAM and trace of rectified crop marks within Logierait SAM

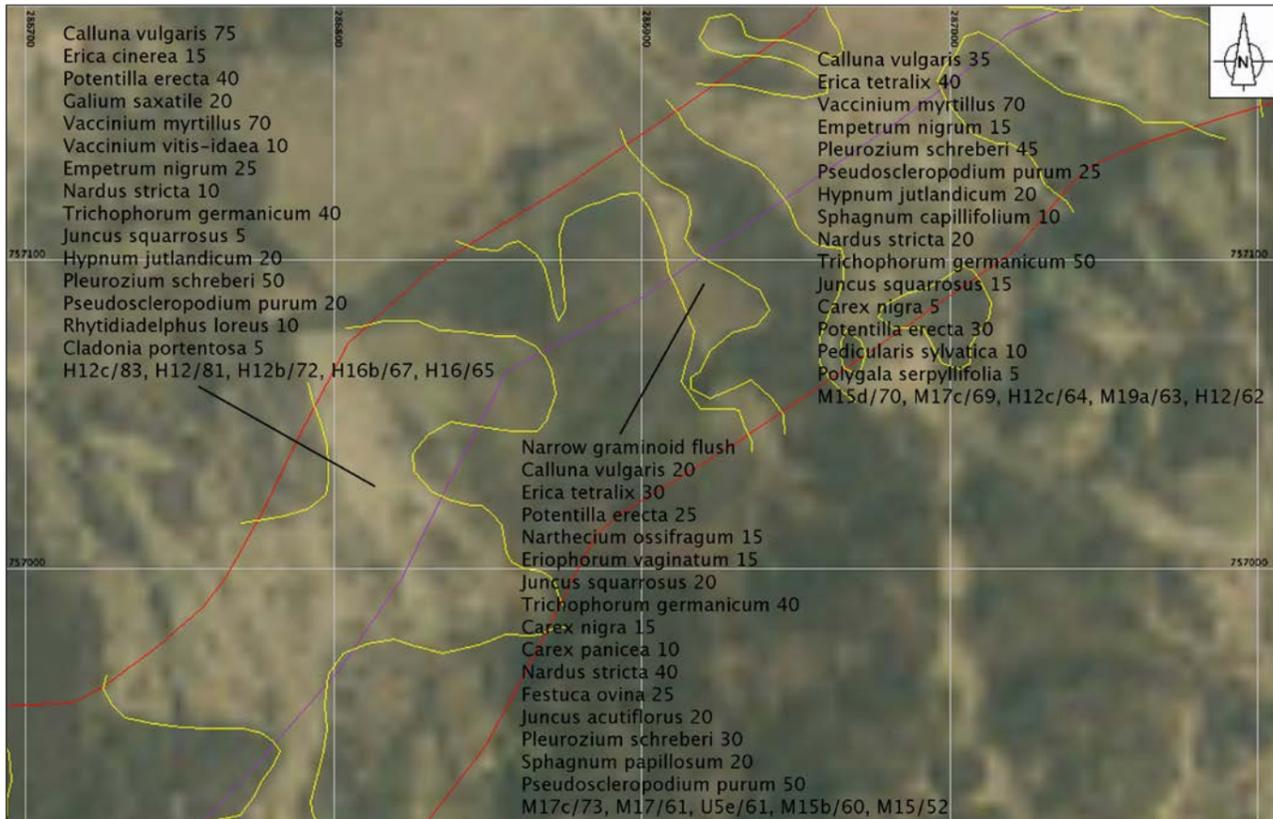


Figure 7 Detail of NVC survey mapping



Figure 9 Overlay of archaeological interest and haul road corridor

### 4.7.3 Cultural Heritage

Perthshire is rich in sites of archaeological interest and several Scheduled Ancient Monuments are located in the environs of the Duntanlich development. Critically the haul road from the A827 is constrained by the Scheduled Monument of Tom Na Croiche, the remains of a 14th century castle standing on the eastern side of the river terraces, overlooking the River Tummel, to the north east of Logierait.

The extensive area of the Logierait Scheduled monument encloses arable fields on the river terraces, enclosing archaeological sites from pre-history, recorded from cropmarks.

Following rectification of the cropmarks on the upper and lower terraces at Logierait, a route for the haul road was identified, which avoided the recorded archaeology.

Although there will be no direct impacts on the SAM, the design of the haul road and its route has had to consider the indirect effect on the setting of Tom Na Croiche.

There is potential for a spread of archaeological features from both the castle and the cropmark complexes, which may warrant further investigation and evaluation. The access track onwards from the transfer site to the mine site avoids such constraints, such as the stone circle adjacent to the Rob Roy Way, within Fonab Forest. These designated monuments have been considered for setting impacts.

### 4.7.3 Noise and Vibration

The mine site and access track are remote from noise sensitive properties and locations. In the vicinity of the transfer site and the haul road from the site to the A827, it is recognised that there is potential for effects on receptors from crushing operations and from road vehicle movements. Within Logierait Wood, Atholl Estates has created forest walks and a bike trail. To the north of the crossing point of the haul road over the unclassified road is an isolated property; to the south is Logierait Cemetery.

An assessment of noise produced from operational activities will include all potentially noise sensitive locations at this lower end of the development and in addition will examine the noise climate at the mine site and on the access track.

Vibration from mine blasting operations will be assessed, although to date no potential impacts have been identified.

### 4.7.4 Construction and Environmental Management Procedures

The management of site construction activities and operations is essential to achieve a successful outcome for the project. A description of the phasing of the development, activities involved and the detailed mitigation measures for these operations will be compiled as a management document for all parties involved. Implementation and monitoring of the procedures is vital.

### 4.7.5 Environmental Consents and Licences – SEPA and SNH

Part B processes with the potential for emissions generations, such as the barite crushing, require licensing from SEPA.

Discharges to the water environment and surface and groundwater abstraction are subject to the Water Environment [Controlled Activities][Scotland] Regulations 2011 [as amended] and are licensable by SEPA. This will apply to mine dewatering and discharge and control of surface run-off from the mine site and will make provision for treatment of any discharges to an appropriate standard.

The Middleton Burn enters Loch Tummel, which is part of the River Tay SAC. Any discharges to the Middleton Burn will demonstrably have to ensure that the integrity of the SAC is not adversely affected.

SNH issues licences permitting the disturbance, in certain situations, of European Protected Species. To date no EPS licensing requirements have been identified.

### 4.7.6 Environmental Impact Assessment

At EIA stage, all licensing requirements will be identified.

## 4.8 Site Services Constraints

### 4.8.1 Water supply

A water supply to the mine site will be required. Water supply for welfare purposes will be two-fold; water for consumption by mine personnel will be a proprietary bottled supply; water for sanitation will be sourced from surface watercourses and from grey water collection and will incorporate buffer tank storage.

At the transfer site a mains water supply can be provided.

### 4.8.2 Foul drainage

Foul drainage demands will be met using a proprietary treatment system appropriate to mine site staff numbers. A CAR licence will be required from SEPA for the treated effluent. Two staff will be provided for at the transfer site building. Ferry Cottage has existing facilities.



Trial adit at Duntanlich



Duntanlich Lochan



The Netherton track

### 4.8.3 Storm Water Drainage

Storm water drainage provision on SUDS principles will be required for operational areas at the mine site and potentially for the area around the transfer site, including collection and oil interceptor systems and de-silting provision. Roof water can be re-routed for grey water harvesting, to augment sanitation requirements.

### 4.8.4 Electricity

A new powerline to the mine site will be required. Discussion with Scottish and Southern Electricity has identified a connection point at Tulachan, on the south shore of Loch Tummel, adjacent to the Nethertron track. The cable will be laid underground along the route of the track and the existing track spur to the mine site, where a sub-station will be established.

The minimal power requirements at the transfer site will be met using a generator within an acoustic housing.

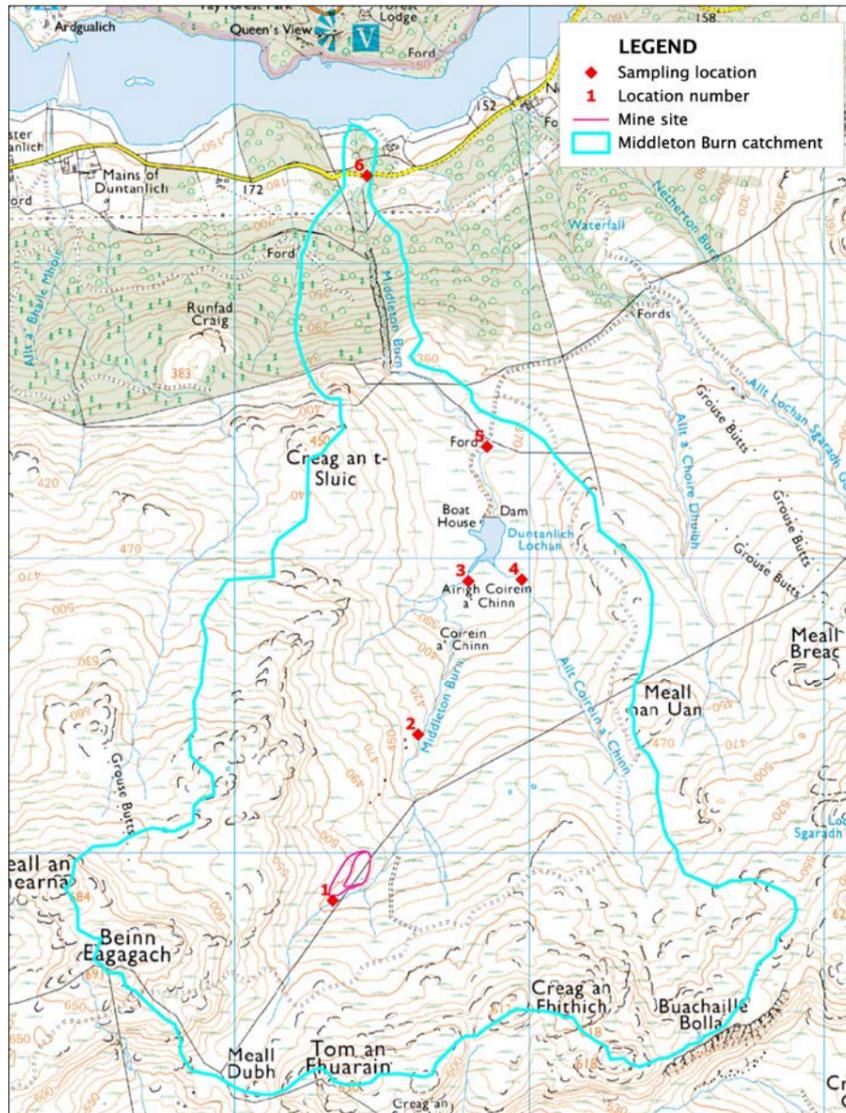


Figure 10 Baseline water sample locations

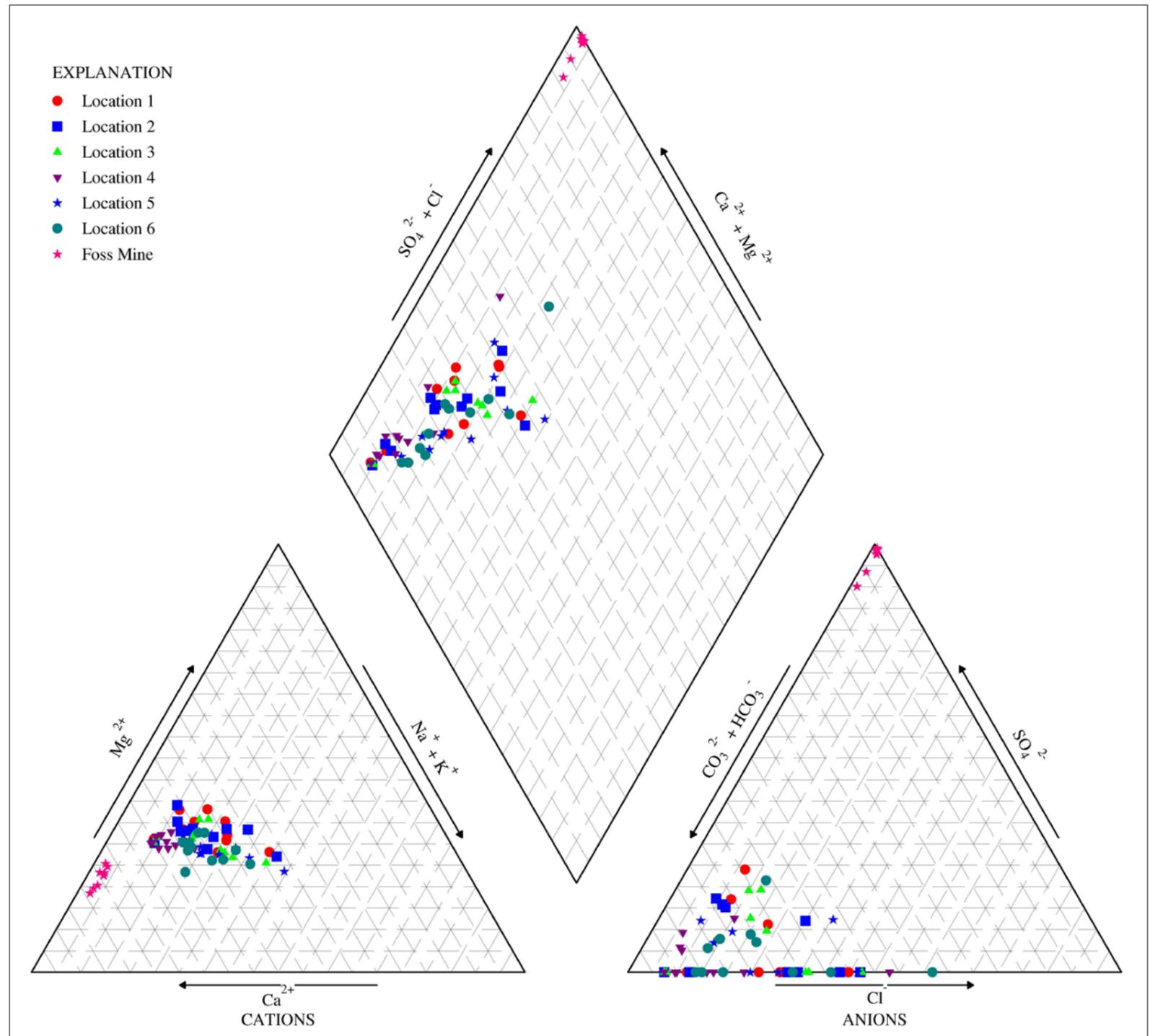


Figure 11 Piper plot: baseline water chemistry

## 5 DEVELOPMENT CONCEPT - DESIGN OUTCOMES

### 5.1 The Proposal

The development of a mine to exploit the world class Duntanlich barite resource was first proposed in 1991, when the extent, size and simple structure of the barite deposit led to planning application by M-I Great Britain. With the dismissing of a planning appeal in 1994 and of a subsequent appeal to the Court of Session in 1996, the M-I Great Britain Foss Mine continued to produce barite, although not at the production rates initially envisaged as a consequence of the highly folded, complex nature of the barite deposit.

Of major concern were the potential landscape and visual amenity impacts on receptors at the celebrated Queen's view and the revised mine development plan prepared in 2000 attempted to address this issue by relocating and reducing the footprint of the mine and transfer sites and by relocating the access track. The revision did not however address concerns about the site access from the A827 being taken through Ballechin.

Over 20 years have elapsed since the unsuccessful planning application and now a greater understanding and wider appreciation of the environment of this part of Scotland should guide the overall design of the mine development.

The Special Qualities of the Loch Tummel NSA, within which the mine site and some 4.5km of track are to be developed, are key to those issues which should be addressed in terms of landscape and visual amenity for the principal receptor, the visitors to the Queen's view.

Although the mine site and the access track lie on the gently sloping land below the crags of the Farragon Ridge, it is Loch Tummel itself which draws the eye and it is therefore the loch and its shores which are potentially more sensitive to development, as viewed from this location. In the wider view, which is that of a historical rural landscape in transition to wooded slopes and rocky summit crags, a development which introduces an industrial element and vehicle movement into the landscape could be seen as intrusive, with potentially adverse effects on the experiential characteristics of the Queen's view.

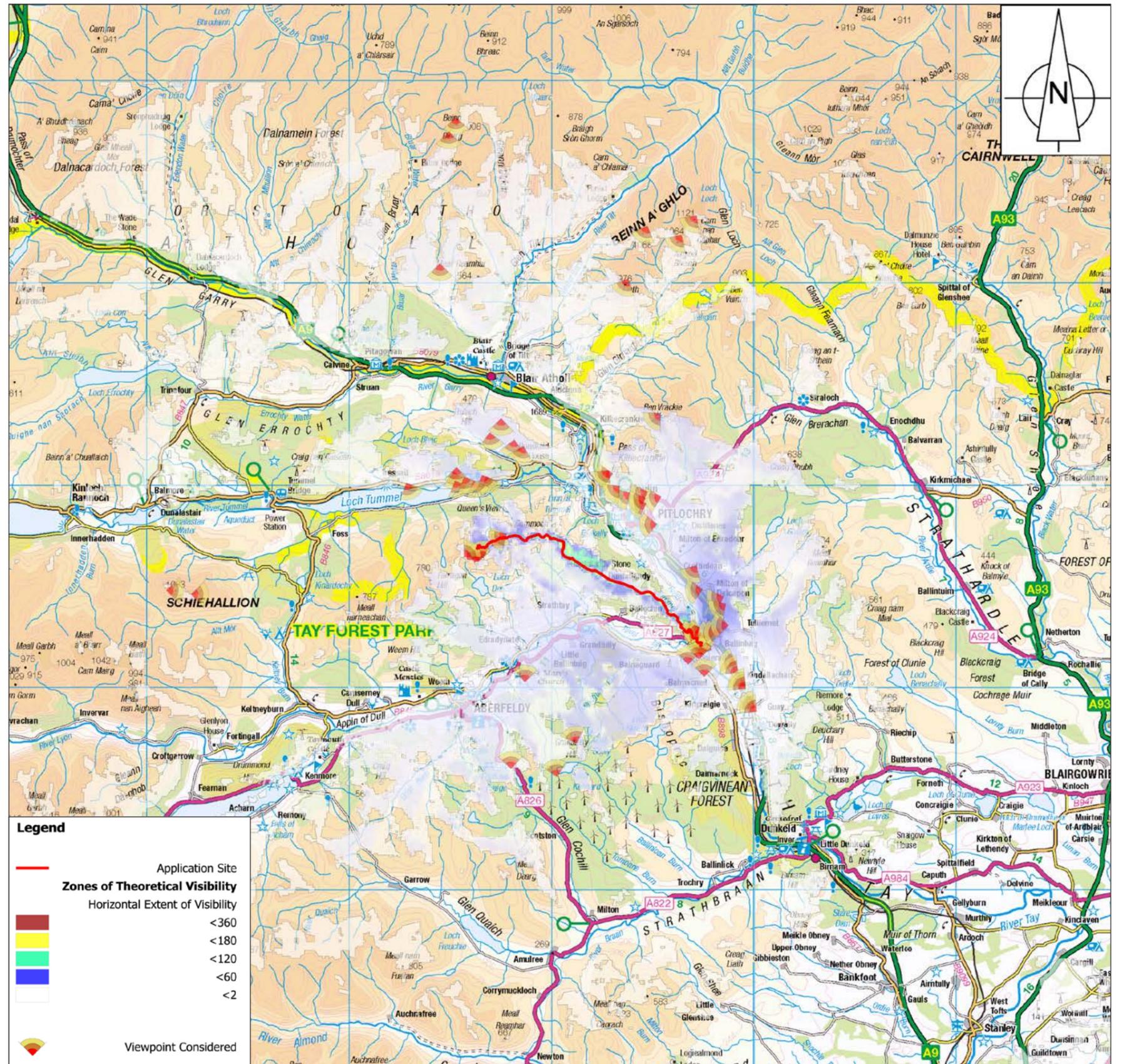


Figure 12 Horizontal ZTV

The Perth and Kinross Local Development Plan 2014 highlights the vision for the region:

*“Our area – highly valued for the beauty of its natural and built environment – is a great place to live, work and visit, and should be developed in a way that does not detract from its attractiveness nor places an unsustainable burden on future generations”*

*“Our rural spaces are not just the source of food and other raw materials; they supply and support our tourism industry, various economic enterprises and a wide range of environmental assets. Consequently, a well cared-for rural environment is a social and economic asset vital to the wellbeing of all of us and our future prosperity”.*

The Duntanlich mine proposals will see a cohesive and minimal development carefully placed into the landscape and topography of the NSA, to ensure that operations do not adversely impact on the visitor experience.

The mine site location has been chosen to be hidden to the north and west by the topography. Viewed from approaches from the east and north east careful landscaping around the site will minimise views of the mine buildings. Only from the upper part of the Netherton track, as it heads westwards to Ben Eagagach, will closer, direct views be obtained. The buildings are few in number, simple in style and low in profile. They will be brown in colour, to avoid contrast against the natural vegetation of the hill slopes. The buildings are clustered within the small mine site area around the mine portal, to minimise ore load transport from the mine entrance to the covered ore storage bins.

Once over the Farragon Ridge, the access track enters Fonab Forest and then Atholl Estate’s Killichangie Woodland and Logierait Woods, mostly utilising existing forest tracks or creating a track within forest rides. This use will be compatible with and similar to current forestry haulage operations.

Borrow pit locations have been identified within the upper, western part of Fonab Forest, to provide stone for the access tracks.

Only at the lower end of the site, essentially along the haul road from the transfer site to the A827, do site operations become apparent.

## 5.2 Consultation and design process to date

Until a fully considered development design could be brought forward, M-I SWACO consultation has been limited to those elements of the development where direct impacts on the environment were identified from desk studies. The process was facilitated by discussions between M-I SWACO, Dalgleish Associates, Rathmell Archaeology, Historic Scotland and SEPA. A wider understanding of the issues and

historical concerns of SNH and the communities of Strathtay and Strathtummel was gained by reference to the documents associated with the previous planning application in 1991, the proposed amendments of 2000 and discussions led by Dalgleish Associates, the local community and M-I SWACO in 2000.

Key issues to be addressed are the location of the mine and transfer sites and associated access and haul roads, together with the site access location, the protection of the water and peatland environment, with particular reference to the River Tay SAC.

Critically, the closure and restoration of the Foss Mine and the ultimate restoration of the Duntanlich site are to be considered as part of the development brief.

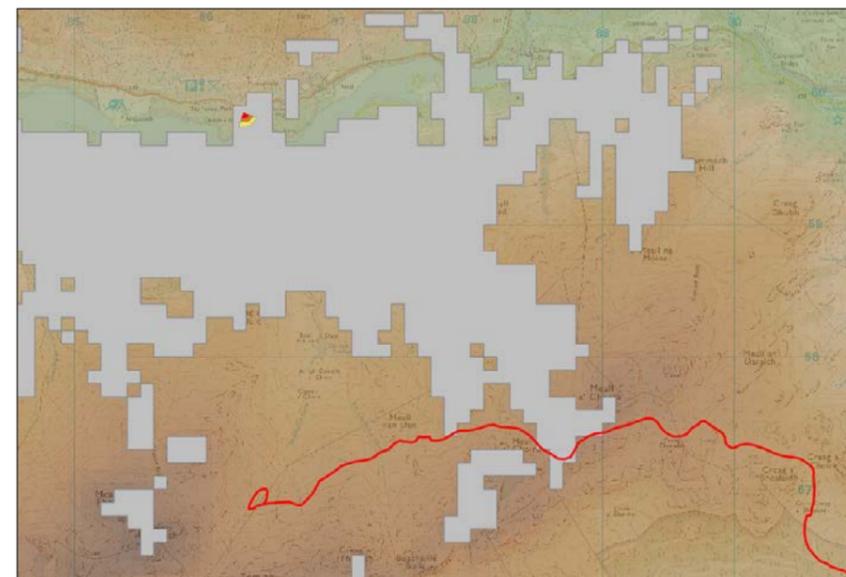


Figure 13 VA output: 10m contour intervals (Viewpoint: the Queen’s view)

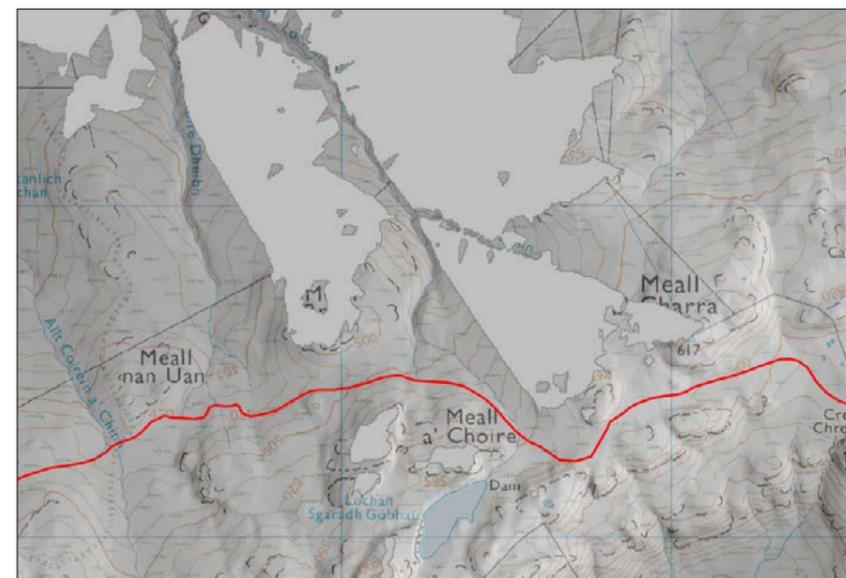


Figure 14 Detail of VA output: 5m contour intervals (Viewpoint: the Queen’s view)

Having identified those development requirements, an iterative design process was undertaken whereby a preliminary assessment was made of the landscape and visual effects, including an examination of 3D models, first on an initial layout and track route, then on subsequent layouts informed by peat probing, peat hazard identification, habitat surveys and detailed NVC mapping. Ornithological studies confirmed the presence of Merlin in the area and identified nesting sites. Consultation with Historic Scotland identified significant archaeological interest in the fields to the northeast of Logierait which has informed the layout of the haul road from the transfer site to the A827.

This enabled a series of alterations to the site layout and access track route within the NSA, in particular, to seek to improve it from a functional and landscape and visual perspective, adhering to the development principles and objectives for the site.



Figure 15 Detail of VA output: 5m contour intervals (Viewpoint: Alllean Forest)

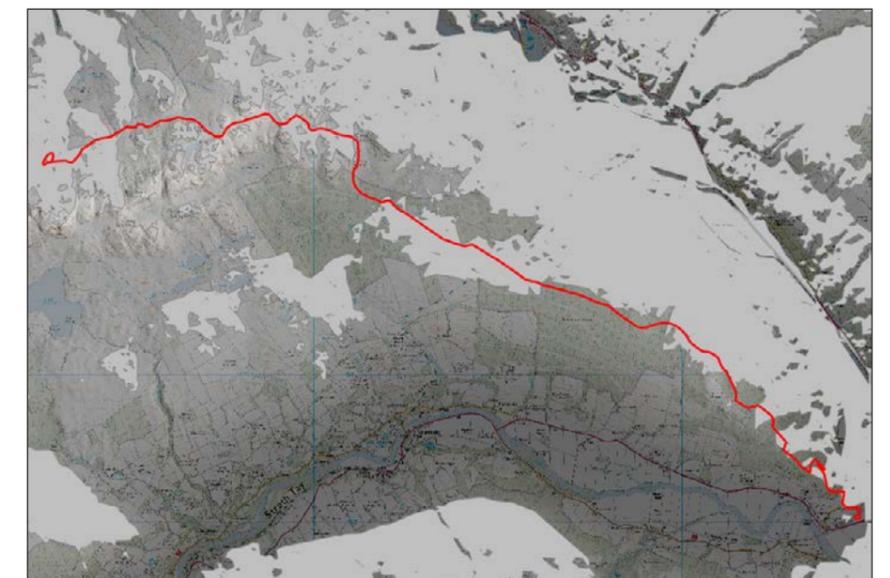


Figure 16 Detail of VA output: 5m contour intervals (Viewpoint: Ben Vrackie)

## 5.3 Development principles and objectives

### Site elements and site operations

- provide for the physical needs of the development of the site to enable barite production sufficient to serve the UK North Sea oil and gas industry
- rationalise and minimise the operational areas – the mine site and transfer site
- make provision for direct access to the development from the road network at a point close to the A9 – no barite road haulage HGVs through settlements

### Site Engineering

- minimise essential construction works by optimising materials balance requirements, minimising adverse environmental effects, minimising initial development costs
- construct the mine site platform from rock won during the development of the initial stage of the mine decline
- “roll back” available peat turf cover during access track construction and replace as part of a peat management plan
- minimise felling requirements at the transfer site location
- construct the haul road to minimise landscape and visual impacts
- provide an improved access at the A827

### Site Layout

- enable utility of movement to facilitate mine and transfer site operations
- functionally integrate the access and haul roads
- provide for visually unobtrusive vehicle parking at the mine site, transfer site and at the relocated M-I SWACO office at Ferry Cottage

### Integration of the mine development with the surrounding landscape

- minimise, through design, potential effects on the special landscape qualities and the landscape experience within the local and wider landscape through careful design and siting of site elements
- proposes landscape and visual mitigation measures [e.g. landforming, planting and restoration of surface vegetation; size, colour and layout of buildings; location of defined site uses] to better integrate the development into the landscape
- minimise land take by using existing tracks wherever possible
- conceal the mine site within the landform
- enclose noisy and particulate producing crushing activities within a building
- attention to treatment of site boundaries and finishes to merge with the surrounding landscape

### Protection and enhancement of the environment

- implement measures where necessary to protect designated areas, European Protected Species, species at threat and their habitats
- avoid loss of important heath and wetland habitats and other habitats important to biodiversity
- implement measures to minimise impacts on or risks to the water environment, in particular the River Tay SAC
- liaise closely with SNH and SEPA
- provide a Construction and Environmental Procedures Document for adherence by all involved in temporary construction and subsequent mining operations at Duntanlich

### Sustainable Development

- provide continued and additional skilled long term employment opportunities for the local area
- sustain indirect employment through use of local and Scottish support services
- ensure that the development has a longer term contribution to the special qualities of the area through the provision and implementation of a high quality rehabilitation and restoration scheme for the Foss Mine and ultimately the Duntanlich development
- in the wider context provide an indigenous and secure long term source of barite for the UK offshore industry and its oil and gas products – energy and chemical feedstock

## 5.4 Project elements

Key elements are described in Sections 4 and 5, Site Appraisal and Development Concept - Design Outcomes and also illustrated in Figures 5 - 16.

## 5.5 Development Phasing

### 5.5.1 Construction Phasing

Initial development will take place at the mine site. A small area of the south facing hillside on the north western boundary will be excavated to establish the mine site platform and the portal surround. The mine portal will be completed and surrounding slopes graded. Excavated materials will be placed to create a landformed mound, further screening the mine site.

Peat turf/peaty soil from the initial excavation will be replaced over the excavation and mound surfaces.

Rock won from the mine decline development will be used in the formation of the access track, from the mine site eastwards, with the borrow pit sources utilised

in the development of the access track from Fonab Forest in a westerly direction. Borrow pit rock will supply the requirements of upgraded and of new tracks through Fonab Forest and Atholl Estate’s woodlands.

Simultaneously an upgraded access will be created at the A827 and the haul road constructed to the transfer site, potentially using aggregates from an external quarry.

### 5.5.2 Site infrastructure phasing

Site utilities provision will be undertaken at the commencement of the development. The power supply will be brought underground along the Nethererton Track to the mine site substation. Foul sewage treatment provision will be addressed. Water supply will be established at the mine and transfer sites. Site run-off control and water treatment area will be commissioned.

Erection of mine site and transfer station buildings will be then be completed. SUDS systems will be incorporated.

Mine plant will be brought to site. A mobile crusher will be deployed within the transfer site building.

Ferry Cottage will be renovated.

### 5.5.3 Timescales

An eighteen to twenty four month build period is anticipated. There will be a six month overlap of barite production with Foss from the date of commissioning of the Duntanlich Mine.

Decommissioning of the Foss Mine is estimated at six months with rehabilitation and restoration works undertaken in the following six month time period. Groundwater rebound and restoration monitoring will continue for a minimum of five years post closure.

Conversion of Ferry Cottage into the M-I SWACO office and rock sample laboratory facility will be undertaken simultaneously with the mine development.

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## 6 NEXT STEPS

The Duntanlich Barite Mine Project Plan has evolved from and been informed by historical studies undertaken in 1991 and 2000 and by the baseline studies undertaken by Dalgleish Associates during the period 2012 – 2014.

Over this period, M-I SWACO has undertaken discussions with landowners, on the compatibility of their land uses and interests with the mine development proposals. M-I SWACO has entered into agreements with Pitlochry Estate Trust, for the mine site and access track over Cluniemore, with Forest Enterprise for the access track and borrow pits within Fonab Forest, and with Atholl Estate for the southern part of the access track, the transfer site and haul road to the A827.

In examining potential constraints to development, Dalgleish Associates had early and informative input from Historic Scotland, concerning the Scheduled Monuments near Logierait and from SEPA, on water quality and mine drainage.

Over this period the Tayplan has been published and in February 2014 the Perth & Kinross Local Plan was adopted. With the publication of the National Planning Framework 3 and the approval of the Scottish Planning Policy in June 2014, the Development Plan is fully up to date.

This new Development Plan provides the framework to take forward the Duntanlich Project Plan to an application for full planning permission. A comprehensive application will be submitted, covering all proposed uses and activities, to establish consent for the mine development. The application will include:

- Statement of design principles
- Environmental Statement
- Planning Statement
- Economic Impact Assessment
- Public Consultation Report

Plus other assessments necessary to support the grant of planning permission. It is envisaged that a planning application will be submitted in Spring 2015.





Mines Rescue training in Foss Mine



Foss Mine barite ore truck loading



Foss Mine portal

# MI SWACO

A Schlumberger Company



Foss Mine site accommodation



Progressive restoration at Foss Mine

