

## Scheduled Ancient Monument Management Plan

<b>SAM NAME</b>	Dolaucothi Aqueduct Dolaucothi Gold Mines
<b>SAM No</b>	CM 200; CM208
<b>PRN</b>	DAT 1947; DAT1948
<b>Forest District</b>	Llanymddyfri District
<b>Forest Name (block)</b>	Dolaucothi

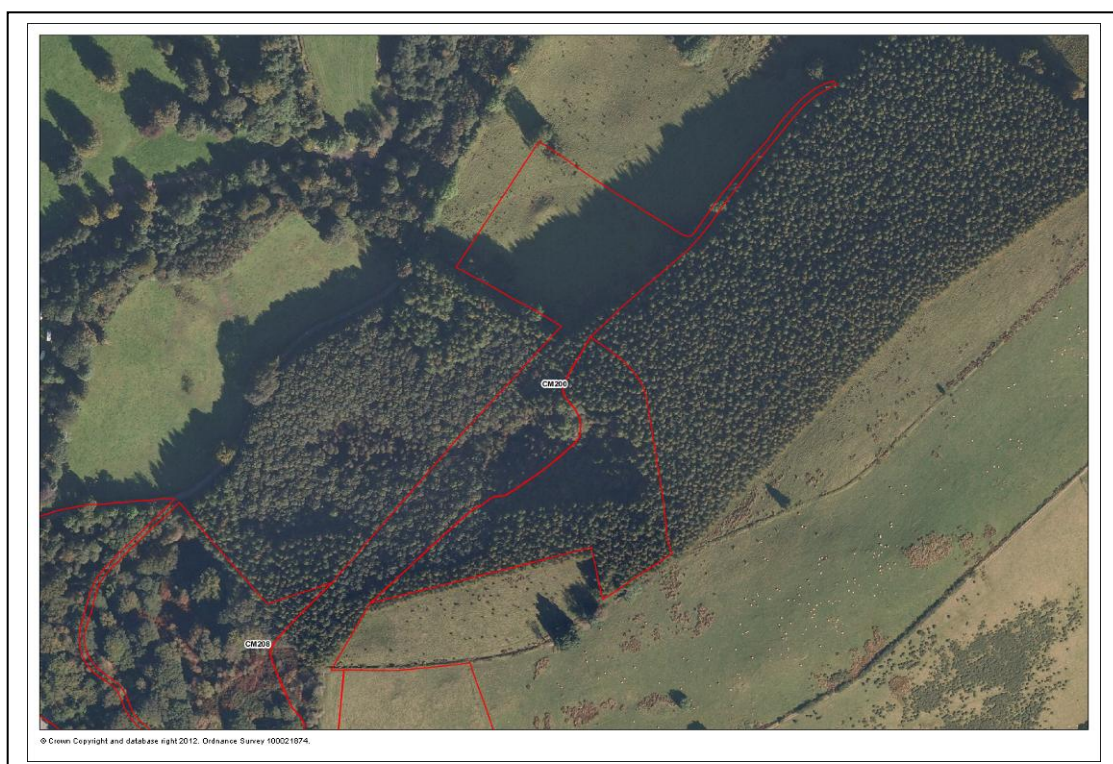


Figure 1. Aerial view of area (© Next Perspectives 2009)



<b>Agreement period:</b>	<b>31/03/2014 – 31/03/2019</b> <b>Reviewed and updated August 2018</b>
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This management plan has been jointly produced by the Historic Environment Branch of Cadw and NRW forest planning staff, to inform the management of the Scheduled Ancient Monument.

**Note: In order to have an opportunity to link with other objectives and programmes, it is recommended that agreement periods are synchronised within the Forestry Design plan (FDP) reviews, therefore, if the FDP is within 2 years of review, an extension of the current plan may be agreed with CADW.**

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<b>PRN:</b>	DAT 1947; DAT 1948
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<b>Consent required on any projects within the plan agreed period.</b>	None
<b>Forest Design Plan Ref No:</b>	03
<b>Grid reference</b>	SN 666 403 to SN 669 407, and adjacent areas

<b>Non-Historic Environment Designations</b>	None
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## **1. Statement of Significance**

### **CM200 Dolaucothi Aqueduct**

The following provides a general description of the Scheduled Ancient Monument.

- The monument consists of the remains of a water channel, dating to the Roman period. It is believed to have been constructed in conjunction with the Roman exploitation of the gold mines at Dolaucothi, probably in the later 1st and early 2nd centuries AD. It runs for a total of about 10.7 kilometres from its source beside a waterfall in the gorge at Pwll Uffern Cothi, down the southern flank of the Cothi valley to the gold mines near the village of Pumsaint, where it fed a number of tanks and was used for various purposes. It was very skilfully designed with a fall of about 1 in 750 throughout, partly as a result of the need to carry it over the saddle beside Allt Dinbeth, which limited the gradient above this point. The channel hugs the contour of the hillside for most of its route, running some way up side valleys at Cwm Dâr, Pen-twyn and Llwynceiliog as a result. Some parts of its course were probably carried on or supported by timber structures which do not survive. While occasional stretches of rock-cut inner face are visible, nowhere is it possible to calculate the original width and depth of the channel. This is the longest and best-preserved leat from the Roman period in Wales (one of only a handful known in Britain) and an important demonstration of the sophistication of water management by Roman engineers.
- Parts of the course have been lost over the years, so that only the better surviving portions have been deemed suitable for scheduling. These stretches were originally designated by separate letters, but subsequent adjustments have now combined some of these. The scheduled portions are as follows: A (SN 71801 46610 to SN 72024 46323); B&C (SN 71633 45924 to SN 71046 45525); D (SN 70987 45426 to SN 70683 45009); E (SN 70643 44945 to SN 70542 44826); F (SN 70387 44663 to SN 70266 44608); G (SN 70123 43906 to SN 69943 43860); H (SN 69818 43912 to SN 69472 43856); J (SN 69628 43391

to SN 68785 43065); K (SN 68737 42951 to SN68216 42700); L (SN 68045 42686 to SN 67916 42614); M (SN 67633 41659 to SN 67227 41112); N (SN 66931 40717 to SN 66705 40011)

- The monument is of national importance for its potential to enhance our knowledge of Roman structural engineering and mining technology. The scheduled sections of the monument are generally well-preserved and an important relic both of their Roman construction and of the subsequent development of the local landscape, in which its line often became a key feature. It retains significant archaeological potential, with a strong probability of the presence of both structural evidence and intact associated deposits.
- The scheduled area comprises the remains described and areas around them within which related evidence may be expected to survive.

### **CM208 Dolaucothi Gold Mines**

- The following provides a general description of the Scheduled Ancient Monument.
- The monument consists of the remains of a gold mine, dating initially to the Roman period (1st to 4th century AD), but with further phases of activity, of which those in the later 19th and early 20th century are best attested. The main focus of the mines lies in and around a saddle on the northern slopes of a range of hills running north-east to south-west, known as Allt Ogofau to the south-west of the mines and Allt Cwmhenog to the north-east. The most obvious feature here is a large opencast working, within which the various features of the present day visitor centre are housed. This opencast is likely to be of Roman date and was originally at least 10m deeper than at present, with passages leading into underground workings at its base. Further opencast workings, trenches and adits are visible at various points along the hills to either side of the main opencast, running altogether for a total of about 1km. The early workings were fed with water by at least one and

probably more aqueducts, the main one of which ran 11km down the Cothi valley from Pwll Uffern Cothi (scheduled as CM200). Various features around the mine area have been postulated as related to the use of this water for different mining and processing activities. The most obvious are two tanks at the lower end of the main aqueduct, which lie to the east of the Caio road; the waste water would have flowed away southwards from here. Crushed material which probably relates to early exploitation extends widely across the floodplain to the north-west of the workings, and the 'Carreg Pumsaint', a rectangular stone with hollows along its sides, is likely to have been used in the crushing process.

- The modern phases of mining were focused below and to the east of the main opencast, with adits driven into the hillside at two points (later linked by a vertical internal shaft) and underground workings leading off a shaft in the main opencast area. Three different foci of processing were used; the earliest lay on the hillside to the east of the main opencast, the second in the south-eastern corner of the opencast itself, while that used in the final phase in the 1930s was constructed on the hillside to the south, near Pen-lan-wen, and reached by an incline from the shaft area. Tailings from this phase were deposited to the south of the workings and would have drained to the south-east.
- The monument is of national importance for its potential to enhance our knowledge of Roman mining practices. The more recent phases are also of historical interest. It retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits.
- The scheduled area comprises the remains described and areas around them within which related evidence may be expected to survive.



#### Additional information

- The NRW holding covers most of section N of the Dolaucothi Aqueduct CM200, and an area of the Dolaucothi Gold Mines CM208 known as the Cwmhenog Pit.
- In this area there is evidence that the ground was worked using a water supply from a tank at the upper end (fed probably by a supply from the Annell valley to the south-east). This was probably used initially to remove the overburden, and possibly later to quench areas which had been heated by firesetting. This technique shatters the rock and enables it to be removed easily.
- In the upper part of the parcel, traces may be present of a further aqueduct parallel with CM200 which is known further up the Cothi valley and there scheduled as CM213. It might be expected to run here somewhere between the 240 and 250m contours.
- Below the line of the main aqueduct (which may have been recut across these workings) are two open adit entrances and various excavated areas which are hard to see due to the vegetation.
- Further water channels or old trackways may run across the hillside below the main aqueduct.
- In the extreme western corner of the parcel, an area of rhododendron may hide further trial trenching and pitting, as found in the adjacent area to the west.

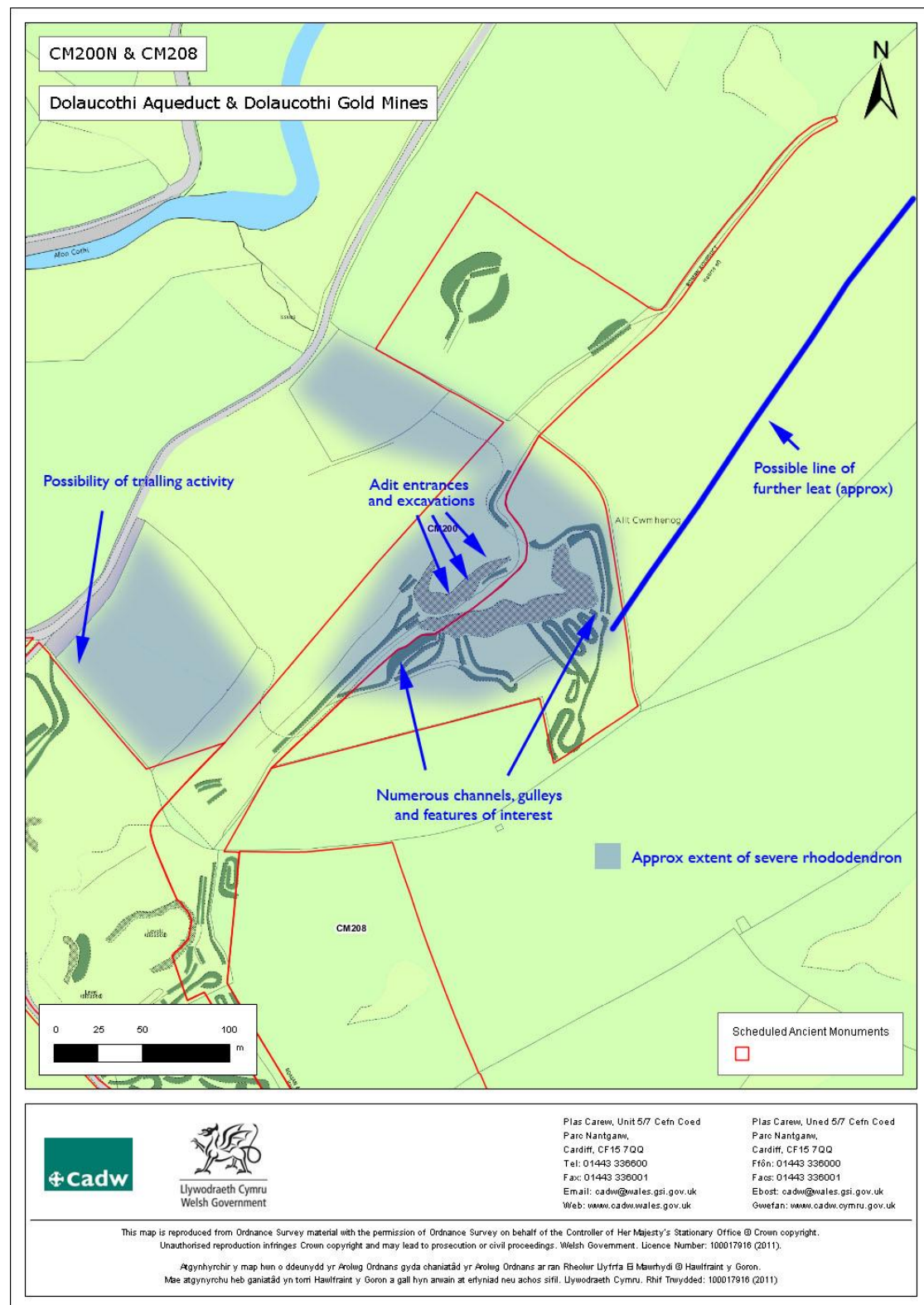
## **2. Current Condition**

- The NRW portions of the sites have been planted, very largely with larch trees.
- The main areas of archaeological interest, with the exception of the north-eastern half of the aqueduct, are additionally nearly all heavily infested with rhododendron (possibly reflecting deliberate planting intended to enhance the former landowner's outlook).

### **2.1. Issues**

- In view of the irregular ground and the various mine features, Health and Safety needs to be a major consideration in the execution of any works in this parcel.
- The site has never received an archaeological survey to modern standards; this would assist greatly with planning any further works.
- Conventional survey may prove difficult due to the density of the vegetation; LiDAR might be helpful.
- The density of the current plantation and the rhododendron growth does not allow the archaeological remains to be appreciated; more open broadleaf woodland with little understorey might be the long-term objective.

### 3. Map of Scheduled Area highlighting management issues (Figure 2.)



#### **4. Management Advice**

The following works are recommended to improve the condition of the scheduled ancient monument. Cadw Field Monument Wardens are available to provide help and advice, and can be contacted via details shown on page 5.

##### **Prioritised list of management works**

###### **2014-15:**

- Explore avenues for improving our survey information on the features present in the parcel, developing a clearer ground plan of the area.
- Continue as far as is practicable with works to suppress the rhododendron in the more readily accessible areas.

###### **2017:**

- Develop plan for the extraction of the larch crop especially in light of the potential for *phytophthora* disease to appear within the parcel.

###### **2018:**

- Extraction of crop during August-September taking advantage of dry ground conditions.

Specific method statements are provided below.

#### 4.1. Category 1 works

**The works included within section 4.1 can be undertaken without scheduled monument consent and without an archaeologist present if they are carried out according to the guidance specified and in accordance with Forests and Historic Environment (UK Forestry Standard Guidelines)**

##### **Specific works required**

- **2014-15:** Explore avenues for improving our survey information on the features present in the parcel, developing a clearer ground plan of the area.
- **2014– ongoing:** Continue as far as is practicable with works to suppress the rhododendron in the more readily accessible areas.

##### **Guidance on works required**

- **Survey:** consult Dyfed Archaeological Trust in the first instance for further advice. Investigate sources of LiDAR information.
- **Rhododendron eradication:** current techniques appear reasonably successful if persisted with. It might be worth pursuing the National Trust with a view to co-ordinating the attack on both sides of the relevant boundaries.

#### 4.3 Category 3 works

**Significant or Intrusive Works such as this require Scheduled Monument Consent using the form available at: <http://cadw.wales.gov.uk/historicenvironment/help-advice-and-grants/makingchanges/schedmonconsent/?lang=en>**

##### **Specific works required**

- Felling of the forest crop within the scheduled area. A crop of maturing larch within the scheduled area needs to be cleared as a matter of urgency due to potential infection with *Phytophthora*.

### **Guidance on works required**

- Contact Cadw for further advice. Contact details shown above on page 4.

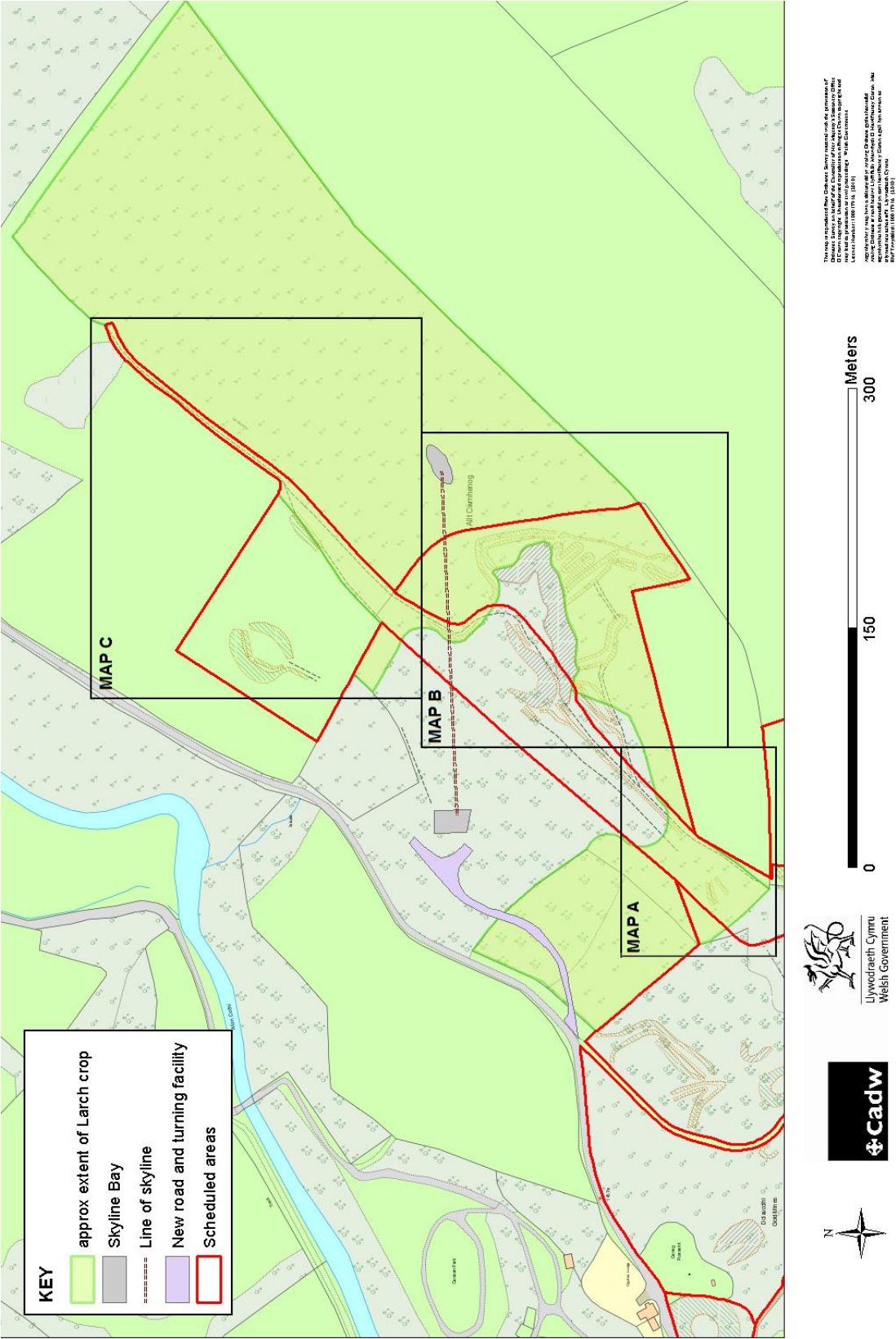
### ***General Guidance on felling of trees***

- Trees should be felled above ground level, with stumps treated and left to rot in-situ.
- Work on trees should be carried out in dry weather so as to minimise ground disturbance.
- All cut timber should be removed from the scheduled area, and no burning should take place within it.
- It will be necessary to admit harvesting machinery into the scheduled area. Felling undertaken by machines within the scheduled will be subject to the detailed guidance below. Sensitive areas are to be felled by hand and timber removed by winching.
- The majority of timber will be moved to the a Skyline Bay on the slope behind Cwmhenog Pit (outside of the scheduled area) before traverse to a lower bay near to the Pumpsaint to Cwrt-y-cadno road (also outside the scheduled area)
- Some timber on the lower slope will be moved down-slope directly to the lower Skyline Bay.

### ***Specific Guidance (see Figure 3)***

- For simplification the larch crop can be divided into three areas:
  - **A.** A block on the valley side between the minor road from Pumpsaint to Cwrt-y-cadno and the Cothi Leat its presumed earlier course.
  - **B.** Trees surrounding the Cwmhenog Pit and its associated hushing gullies, tanks and aqueducts.
  - **C.** The large block north east of the Cwmhenog Pit above the Cothi Leat and its earlier course.

Figure 3. The overall distribution of the larch crop, inserts refer to Figures 4-6.



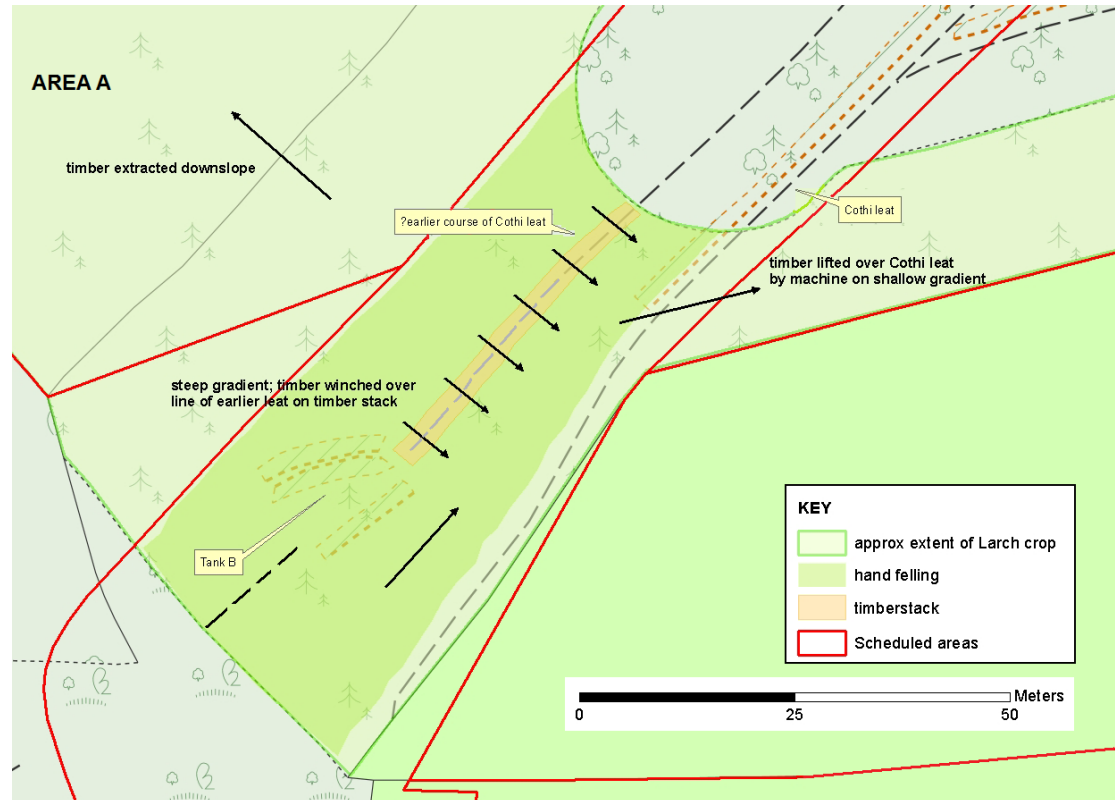
**AREA A (Figure 4.)**

- Known features in this area are:
  - The extent upper line of the Cothi Leat running north east to south west, this is a well-defined earthwork appearing as a shelf traversing the slope about 1-2m wide and is in use as a footpath.
  - The presumed earlier course of the Cothi Leat (prior to the development of the Cwmhenog Pit) running parallel to the above about 10m lower down slope. The earthwork can be traced as an intermittent level shelf c 1-2m wide maintaining a gentle descending gradient on the contour before entering Tank B (below). The Leat then exits Tank B and then continues to the boundary of the forest in a similar manner. The leat has been planted upon.
  - Water storage tank B. This appears as a pronounced embanked earthwork c 12m long on the south side of which is a deep gully some 3-4m wide by 2m deep, possibly a trial slot, or related to the leat itself. It has been planted upon.
- **N.B.** Other as yet unidentified features may be present including but not limited to:
  - A possible lower level leat has been recorded to the north east. If present this would traverse the area near to the c 170m contour level about half way down the slope.
  - There is the possibility of trialing activity near to the Cwmhenog Pit (Figure 2).



## Timber extraction:

Figure 4. Area A.



1. The majority of the crop below the lower identified leat and Tank B can be extracted by machine down towards the timber extraction track / timber stacking area to be constructed to the north east (Fig 4).
2. The uppermost part of the crop approaching the lower identified leat will need to be hand felled due to the steep gradient and winched away either up or down slope.
3. The crop on the lower leat , on tank B and in the area between the lower and upper leats will need to hand-felled and removed by winching. Timber will need to be moved over the lower leat which has a pronounced cut and embankment.
4. **The proposed methodology for point 3 is:**

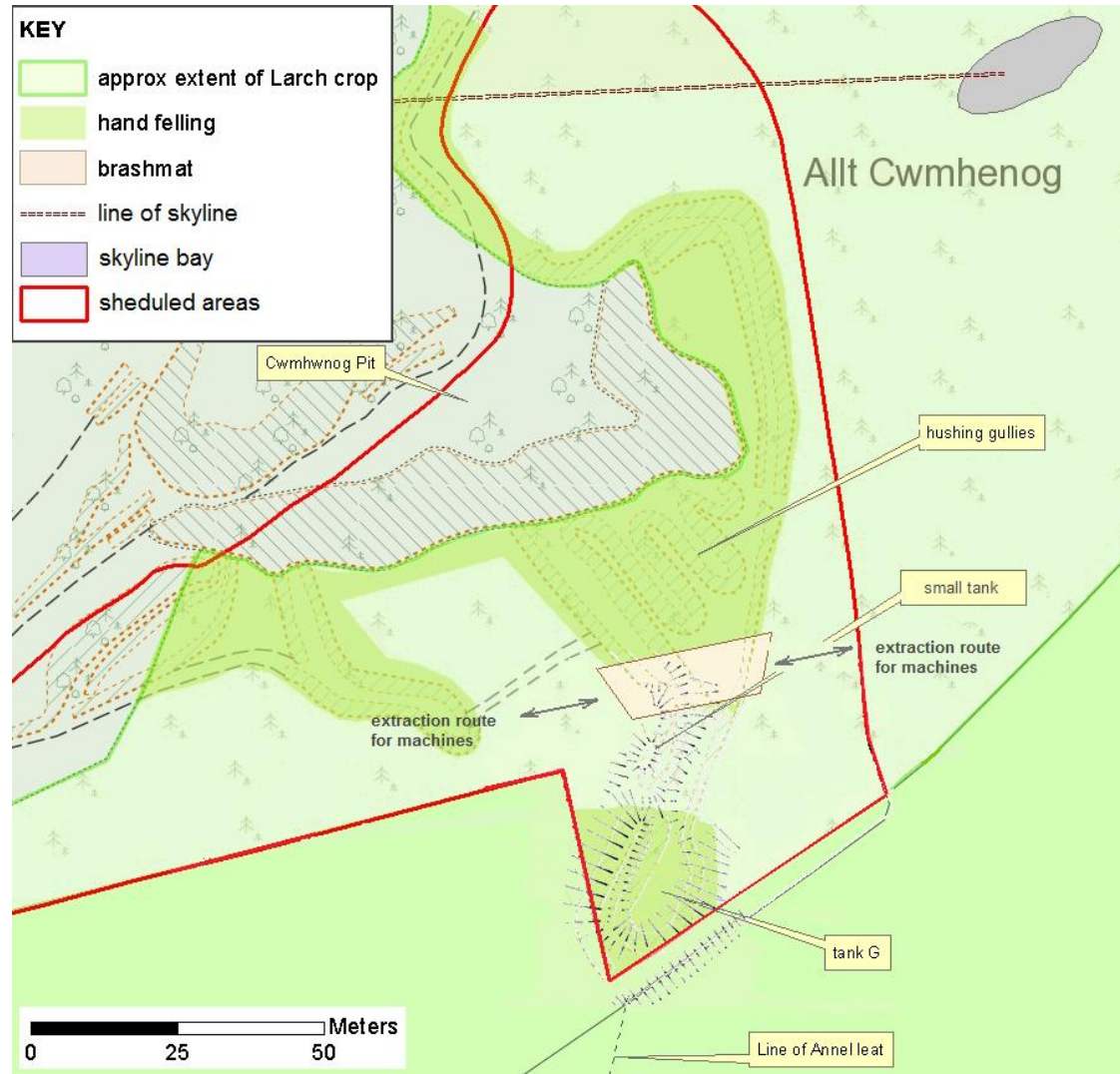
- **Assemble timber stack (cut branch stripped timber) to run both parallel to and upon the lower leat at one specific location**
  - **Winching of cut timber over this stack with close monitoring to ensure no damage occurs to the feature.**
  - **Watching brief**
5. In the area of the upper leat the features can be protected by removing timber over it without physical contact by utilising machinery positioned further up-slope of the leat which has sufficient reach.

**AREA B (Figure 5.)**

- Known features in this area are:
  - Tank G: and earthwork feature measuring c 27m north-south by c 12m east-west with a substantial outer bank surviving to c 2m and believed to have been fed by the Annel Leat which approaches from the south. A sluice outlet is conjectured on the north side.
  - A small feature identified by earthwork survey in 1993 just to the north of tank G: a rectangular area with a low mound on the downslope side measuring c8m north-south by 5m east west maximum conjectured to be a second smaller tank.
  - A series of hushing gullies; channels used for directing large quantities of water released from the tanks (and partly created in the process) towards the areas of open-cast mining. These take the form of a series of parallel gullies to the north of tank G, the easternmost of which progresses around the edge of the cut of the Cwmhenog Pit for c 50m.
  - The Cwmhenog Pit open-cast is defined by a pronounced scarp and drop. Though this scarp is colonised by trees, the planted Larch crop appears to stop short of it.
- **N.B.** Other as yet unidentified features may be present including but not limited to:
  - A high level leat known from further up the Cothi Valley (as SM CM213) which could be present at the c the 240 and 250m contours (see Figure 2.)
- Continued on following page

## Timber extraction:

Figure 5. Area B.



1. The crop on the earthworks of the hushing gullies and of the tank will need to be hand felled and removed either by machines positioned off these features or winched away over brash mats.
2. Brash mats should be used in any area where it is necessary for a machine to operate over a prolonged period.
3. The crop that extends west between the southern margins of the Cwmhwnog Pit and the southern boundary of the coup will need to be extracted eastwards in the direction of the skyline bay by machine. A significant

obstacle to this is the hushing gullies which are features at high risk of erosion and also by being deep depressions are difficult for machinery to cross.

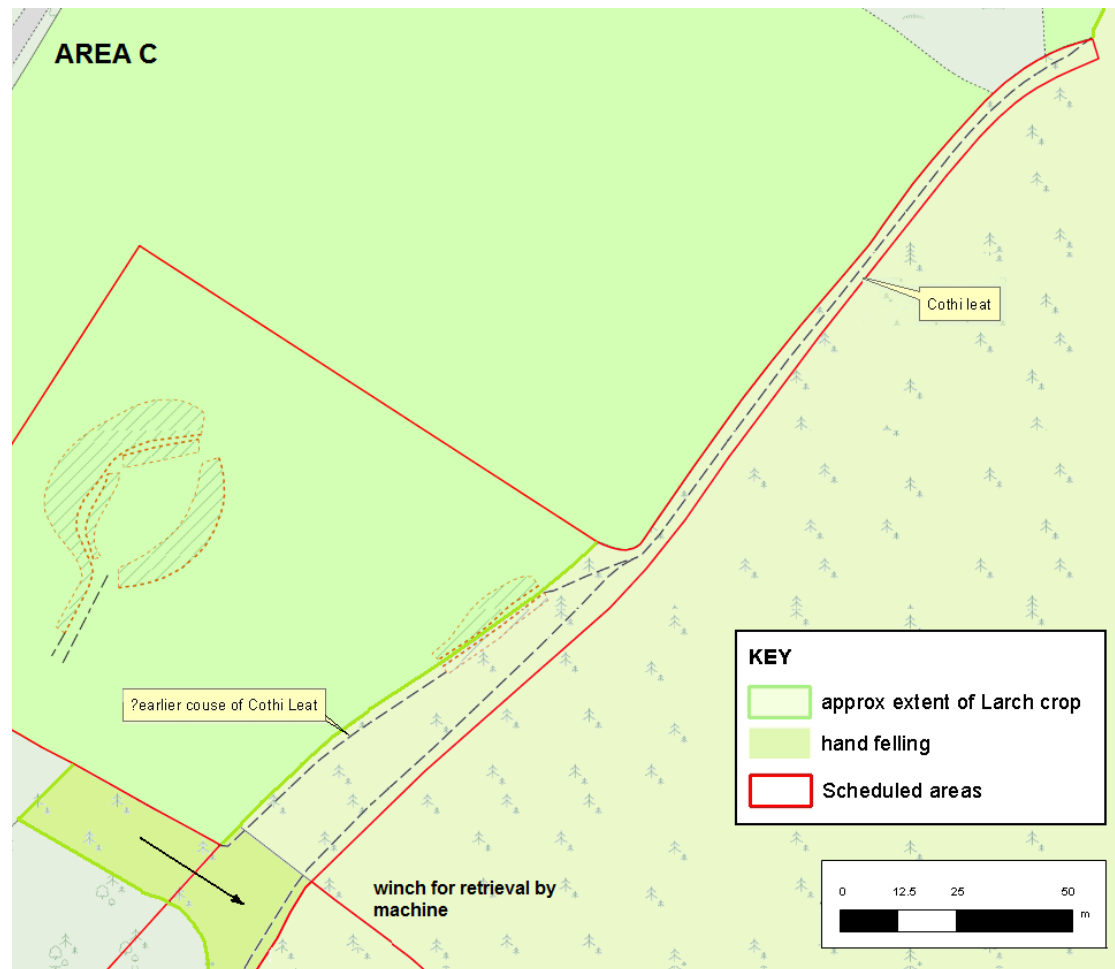
4. It is intended to achieve this by crossing the area of gullies at a specific location: this is just north of the identified 'small tank' earthwork feature described above: here the depth of the gullies is relatively shallow before they deepen towards the fall to the pit.
5. **This proposed methodology for points 3 and 4 is:**
  - **Close marking of all features in the vicinity and taping of the full access route across the features.**
  - **Placing of a brash mat of sufficient depth over the gully area to allow machinery to pass over without ground disturbance.**
  - **Continuous renewal of the brash mat throughout the period of vehicle/machinery movements.**
  - **Watching brief.**

**AREA C (Figure 6.)**

- Known features in this area are:
  - The line of the Cothi Leat, the eastern part runs through the forest, the western along the forest boundary, formerly used as a footpath. The current boundary fence is on the leat so that part of the scheduled area falls within the adjacent field.
  - The earlier course of the Cothi Leat and their junction. The earlier leat runs along the forest boundary. The current boundary fence is on the leat so that part of the scheduled area falls within the adjacent field.
- **N.B.** Other as yet unidentified features may be present including but not limited to:
  - The high level leat known from further up the Cothi Valley (as SM CM213) possibly present at around the c 240 to 250m contour (outside the scheduled area, Figure 2.)
- Continued on following page

### Timber extraction:

Figure 6. Area C.



1. Timber within the majority of the scheduled area can be removed from outside the scheduled area from the east by machine, including the area between the two leats as they are sufficiently close.
2. One small area of larch running down the western boundary of the field north of the leats, on the margin of an area planted with red oak, will need to be felled by hand
3. and winched back to where it is accessible by machine. Brash mats will need to be placed over the line of the earlier leat to facilitate this safely.

**Summary Table**

<b>4.1 Category 1 Works</b>  <b>These works can be undertaken without scheduled monument consent and without an archaeologist present if they are carried out according to the guidance specified.</b>	<b>4.2 Category 2 Works</b>  <b>These minor works require Scheduled Monument Consent under the Ancient Monuments and Archaeological Areas Act 1979</b>  <b>Consent will be granted automatically by completion and return of the form provided with this Management Plan.</b>	<b>4.3 Category 3 Works</b>  <b>These works require full application for Scheduled Monument Consent under the Ancient Monuments and Archaeological Areas Act 1979</b>  <b>Full application required. Contact Cadw Field Monument Warden.</b>
<b>Projects / Tasks</b>	<b>Projects / Tasks</b>	<b>Projects / Tasks</b>
<ul style="list-style-type: none"> <li>• Vegetation cutting &amp; clearance (rhododendron control)</li> <li>• Felling of forest crop around the scheduled area</li> </ul>	<ul style="list-style-type: none"> <li>• Not Applicable</li> </ul>	<ul style="list-style-type: none"> <li>• Felling of forest crop within the scheduled area.</li> </ul>

**5. Opportunities**

- The NRW parcel is currently overgrown and in a generally 'unreadable' and rather dangerous condition, so public access is not feasible.
- If, however, the remains can be rendered more 'readable' by vegetation control there may be scope for public access and interpretation, though some health and safety measures would probably need to be put in place. These would be likely to require Scheduled Monument Consent.



## 6. Photographs



Figure 7. Tank B (SN 6658 4034) from NE. 05/04/2017.



Figure 8. General view from W in SW corner of parcel. (NRW 14/04/2014)





Figure 9. Aqueduct looking NE, SW of quarry. (NRW 14/04/2014)



Figure 10. Aqueduct looking NE, near quarry. (NRW 14/04/2014)





Figure 11. General view of lower part of quarry area. (NRW 14/04/2014)



Figure 12. Opening in lower part of quarry area. (NRW 14/04/2014)





Figure 13. General view of lower part of quarry area.(NRW 14/04/2014)



Figure 14. Area in ideal condition, just N of quarry. (NRW 14/04/2014)



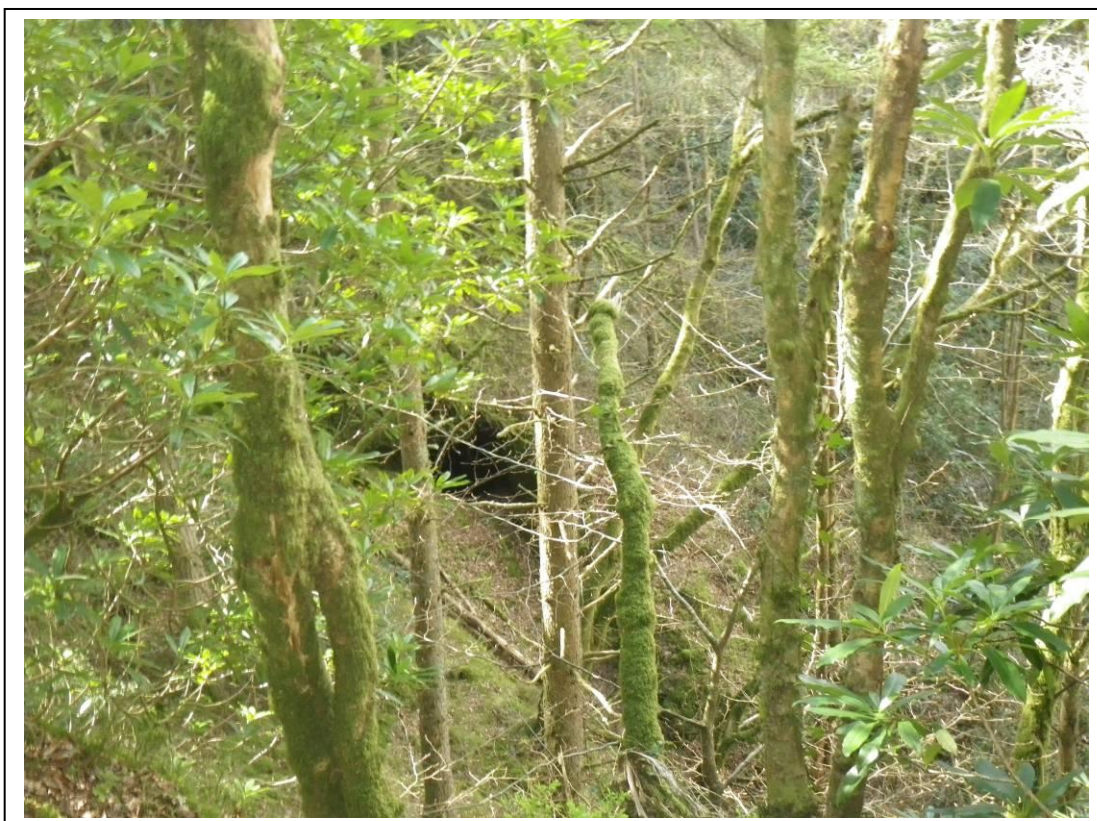


Figure 15. Opening in lower part of quarry area .(NRW 14/04/2014)



Figure 16. Aqueduct to N of quarry, looking NE. (NRW 14/04/2014)





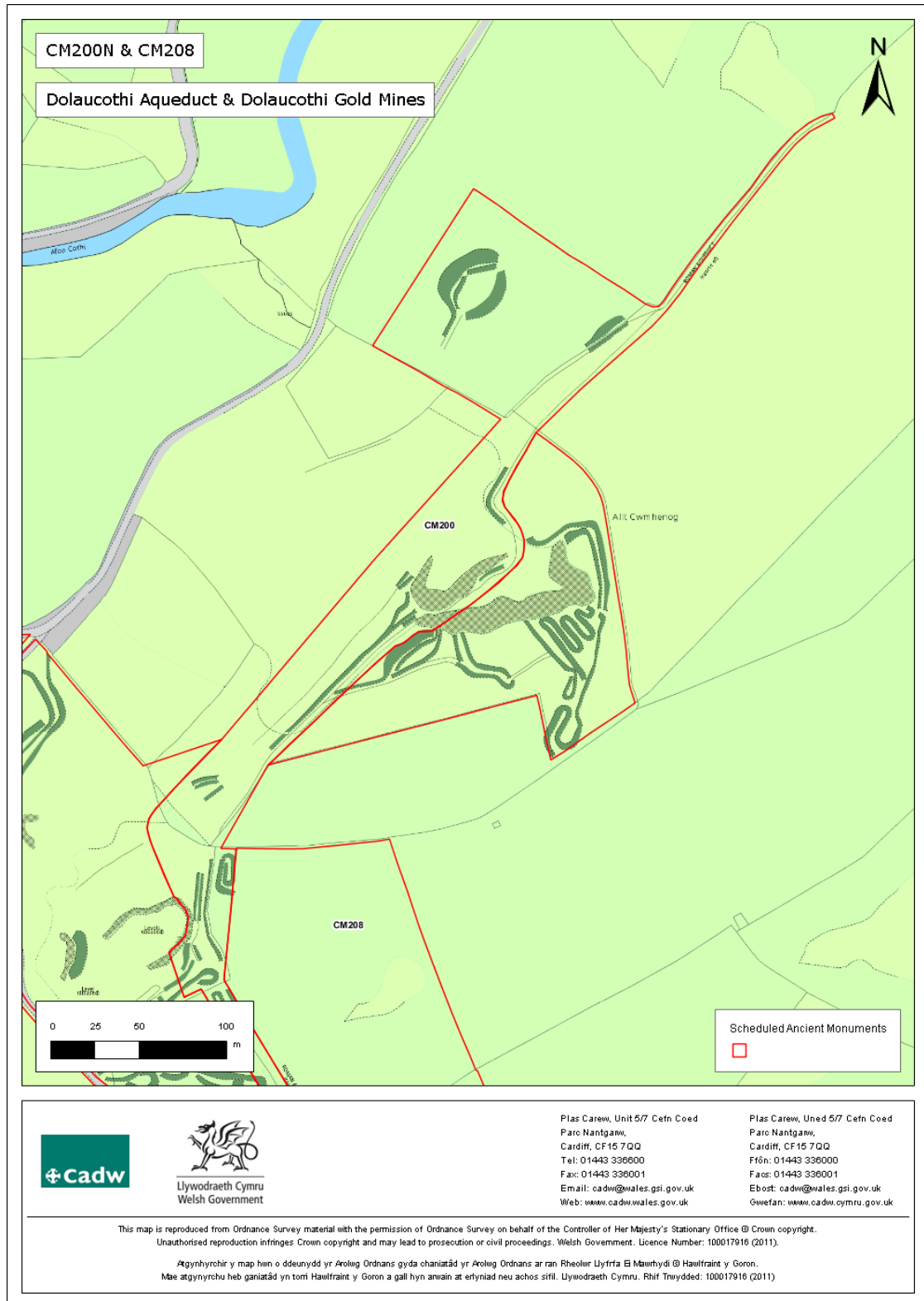
Figure 17. Aqueduct looking SW from near SN 669 407



Figure 18. Aqueduct looking NE from near SN 669 407

## 7. Appendix

### 7.1. Definitive Map of Scheduled Area



## **8. Requirements**

### **8.1. Ancient Monuments and Archaeological Areas Act, 1979**

Scheduled Ancient Monuments (SAMs) are monuments deemed to be of national importance and as such are protected under the Ancient Monuments and Archaeological Areas Act, 1979. It is an offence under the legislation to cause damage or disturbance to a SAM.

Damage or disturbance would include – any unauthorised works that involve ground disturbance (including fencing), but also importing material into the scheduled area, metal detecting, rewetting, burning etc.

Any operations involving ground disturbance, the importation of material or rewetting require Scheduled Monument Consent (SMC) to have been approved by CADW prior to the works being undertaken.

### **8.2. UK Forestry Standard (UKFS)**

Further information is available in the UK Forestry Standard (UKFS) and is the reference standard for sustainable forest management in the UK – Historic Environment.

<http://www.forestry.gov.uk/ukfs>