

Pumsaint Roman Fort, Carmarthenshire

Provisional Heritage & Road Widening Appraisal

Waun Maenllwyd Wind Energy Hub Limited



October 2022

Version 3

Hampton Heritage Design & Consultancy Ltd

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SUMMARY

This provisional Heritage Appraisal has examined the implications of a proposal to widen a road junction which lies within a scheduled monument, and has assessed the potential impact of the scheme on heritage assets. An initial options appraisal identified this access route as the only viable option for transporting turbine blades to a potential wind farm. Due to the national importance of the buried archaeological remains, an engineering solution has been developed which would result in a floating road, requiring no direct physical impacts through groundworks into the scheduled area.

1.0 INTRODUCTION

1.1 Purpose of report

This appraisal has been commissioned by Waun Maenllwyd Wind Energy Hub Limited to clarify the potential constraints and risks for a proposed wind farm access route, which crosses part of Pumsaint Roman Fort, a scheduled monument CM226 (NPRN 303908) and a Registered Park and Garden (RPG) (Dolaucothi Grade II). It will consider the options for avoiding the scheduled area and RPG, the potential impacts if the access needs to cross the monument, and outline solutions to minimise any direct physical impacts.

1.2 Planning background

A planning application for a wind farm at Waun Mainllwyd, approximately 3.5km southeast of Llanddewi Brefi, is being made by Belltown. Access is proposed to be via an existing forestry track from the south, which branches off the A482 within Pumsaint, just north of the Afon Cothi. Although the access road follows an extant track, during construction and decommissioning, and potentially during subsequent intermittent maintenance, a widening of the eastern turn off the main road would be required to allow the low loaders carrying turbine blades sufficient space to make the turn.

1.3 Location, topography and land use

The site is located at National Grid Reference SN 65663,40518 (Figure 1), at c. 130m AOD. The forest track east of the A482 is asphalted, and bordered to the south by a wooded area that drops towards the river. A cottage lies to the north of the track (Dolaucothi Lodge), and a house and garden is located west of the A482 opposite the turn off. The A482 crosses the Afon Cothi and then rises towards the village, with a steep descent to the land east of the road due to the elevated height the road follows for the bridge crossing.

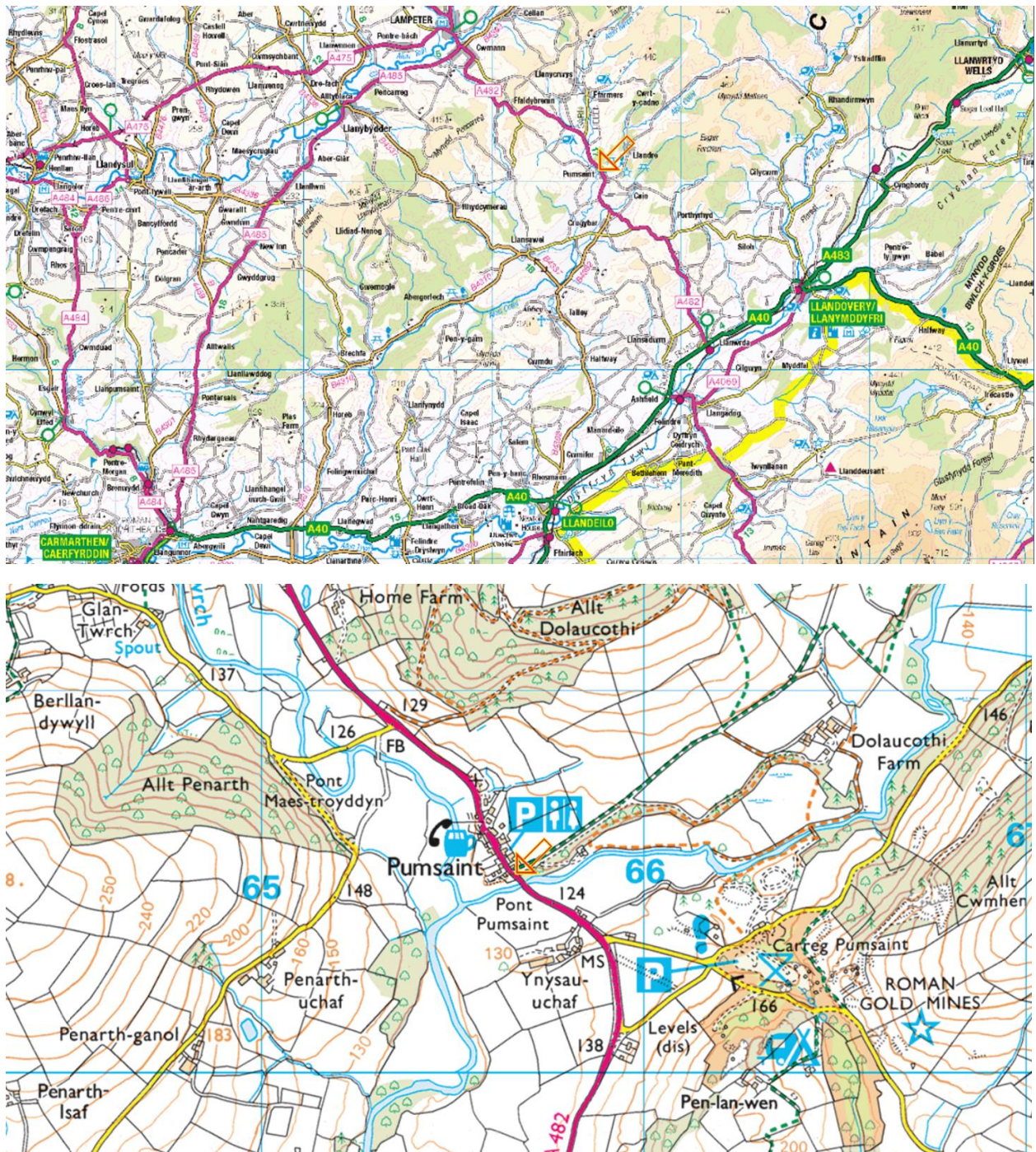


Figure 1 Site location (arrowed)

1.4 Scheduled monument

The statutory designation provides protection for a Roman fort and although the roads are excluded from the designation, the proposed widening of the turn off from the A482 into the access road would affect a small zone on the southern edge of the scheduled area (Figure 2 and Appendix A Drawing 2).

The scheduling description explains its significance:

"The monument comprises buried features and earthworks representing a Roman fort. The primary Roman fort network was designed and constructed by the Roman army for the purpose of military conquest and rule. The fort, originally probably measuring c.150m x 125m, and enclosing 1.9ha, was founded in the mid AD 70s, and was reduced in size to c.0.9ha c. AD 100, before apparently being abandoned by the AD 120s, a fairly typical chronological range. The fort may have had a special function in relation to the nearby Dolaucothi gold mines. Excavations within the fort, west of the main A482 both north and south of the Dolaucothi Arms, have revealed a number of phases of internal buildings, including a granary, as well as a well/cistern, and a burnt timber structure in a 2m-deep pit which was dated to the later 3rd or early 4th century AD, raising interesting questions about the nature of later Roman occupation on the site, traces of which are otherwise extremely elusive. Geophysical survey in unexcavated areas suggests that further structures, including a probable bath house on the eastern outskirts, remain to be found here.

The monument is of national importance for its potential to enhance our knowledge of Roman military organisation. The monument forms an important element within the wider context of the Roman occupation of Wales and the structures may contain well preserved archaeological evidence concerning chronology, layout and building techniques.

The scheduled area comprises the remains described and areas around them within which related evidence may be expected to survive."

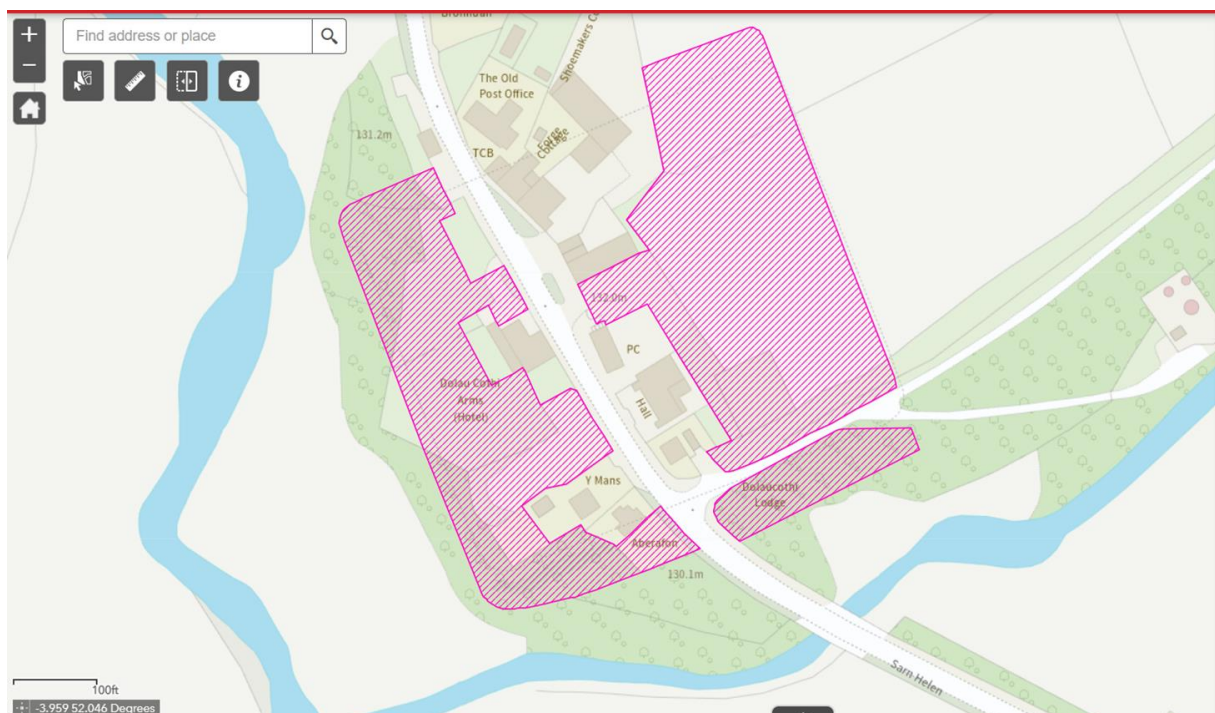


Figure 2 Scheduled areas as shown on the Historic Wales portal

1.6 Heritage sensitivity

Archaeological investigations have been undertaken at Pumsaint on several occasions since the 1970s¹. Although none of these have excavated the specific zone under appraisal here, results from trenches, area excavations, watching briefs and other interventions have allowed a reasonable understanding of the probable layout, chronological development and conditions of preservation of the monument. Figure 3 shows the defensive circuit of the Phase B fort from the mid AD 70s, coinciding with the track turning off the modern road. The wooded area that would need to be used for the road widening lies adjacent on the south-eastern edge of the line of the defensive ditch.

The defences are believed to have comprised a ditch and bank with a timber rampart. Excavations of the defensive ditch reported in 1974 (reopened in 1989) showed a 3m wide V-shaped ditch 1.4m deep with an ankle-breaker feature at the base (Burnham and Burnham 2004, p.22). Excavations in 1993 and a watching brief for a replacement foul sewer pipe in 1995-6 in locations north-west and west of the track turn off from the A482, suggest a post-Roman overburden of 0.7 – 1m in depth (ibid. p.197-9) within the village. At Y Mans c.10m west of the turning, however, stone walls, foundation trenches and gravel road surfaces were found at a depth of c.0.5 – 0.6m below ground level.



Figure 3 Plan of Roman fort from Burnham & Davies 2010, p.278

¹ Jarrett, M.G. (ed.) Nash-Williams, V.E. 1969 *The Roman Frontier in Wales*, University of Cardiff Press (2nd ed) p.110-111 and 172; Jones, G.D.B. & Little, J.H. 1973 *Carmarthenshire Antiquary* Vol. 9, 3-27; Jones & Little 1974 *Carmarthenshire Antiquary* Vol. 10, 3-16; Johnson, A. 1983 *Roman Forts A & C Black*, London, p.186; Burnham, B.C., and Davies, J.L., 2010 *Roman Frontiers in Wales and the Marches*, Royal Commission on the Ancient and Historical Monuments of Wales, p.276-281; Burnham, B. and Burnham, H. 2004 *Dolaucothi-Pumsaint: survey and excavations at a Roman gold-mining complex 1987-1999*, Oxbow Books

2.0 OPTIONS APPRAISAL

2.1 Access Route Options Appraisal

Belltown Power has undertaken a detailed route options appraisal as part of its development of Waun Maenllwyd Wind Energy Hub. This consists of a detailed analysis of all possible wind turbine delivery routes from the proposed port of delivery to the site location to identify an access route that is both technically and economically feasible and that minimises transport impacts.

The assessment is split into two sections. Firstly, a public highway section, which covers the route from delivery port to near the site entrance. Secondly, a site track section, which covers the final approach to the wind farm and connects the site to the public highway.

2.2 Location of Waun Maenllwyd Wind Energy Hub

Waun Maenllwyd Wind Energy Hub is located in Ceredigion, ca. 3.5km to the southeast of Llanddewi-Brefi. The site is located in a pre-assessed area as defined by *Future Wales: The National Plan 2040*² determined by the Welsh Government. The same policy document acknowledges the need for higher tip heights to accommodate larger turbines, which are required to ensure projects are economically viable without government subsidies. Larger turbines require larger components than older technology, with modern blades typically 55m to 85m in length. These are inherently more challenging to transport over existing road infrastructure in Wales. Thus, careful consideration must be given to the technical and economic feasibility of any identified route.

There has been relatively little wind farm development in the vicinity of the proposed site. The closest large-scale wind farm, Brechfa Forest West, is ca. 29km to the southwest, which means there is limited opportunity to utilise previous wind farm delivery routes.

2.3 Public Highway Route

For the route from port to site, Belltown contracted two separate consultants - Pell Frischmann and WYG (now Tetra Tech) - to analyse potential delivery routes. The Port of Entry (POE) was determined to be Swansea, since it is the closest suitable port to the wind farm. Three main routes from Swansea were considered, approaching from the southwest, north and south (see Figure 4).

Route 1, approaching from the southwest, would use the same route that Brechfa Forest West Wind Farm took up until Gwyddgrug on the A485. Abnormal delivery loads would continue north on the A485 through Lampeter and onto the B4343 with a view to using either one of the many unclassified roads turning east off the B4343 or establishing a bespoke access track. Route 1 was ruled out due to a series of impassable pinchpoints on the A485, B4459 and B4343. The B4343 in particular is defined by several unsuitable small stone bridges and sections of road that are too narrow and include too many sharp bends to facilitate the delivery of a ~68m turbine blade.

By virtue of the B4343 being unsuitable for abnormal delivery loads, an approach from the north (Route 2) was ruled out as it would have required access via the B4343 from Lampeter to Llanddewi-Brefi. Even if this had been feasible, it would be technically infeasible to navigate the historic village of Llanddewi Brefi which is defined by very narrow residential streets and includes several cultural heritage designations, including a conservation area and a collection of listed buildings.

² <https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf>

From the south (Route 3), delivery vehicles would use the A482 to approach the site via Pumsaint. This route was deemed the only suitable route due to there being significantly fewer pinchpoints, none of which were deemed to be impassable. Given the unsuitability of the B4343 for abnormal loads, following the A482 through to Lampeter was not considered as an option. As such, the only viable options for the site access track (connecting the site with the public highway) were limited to the A482 from the south.

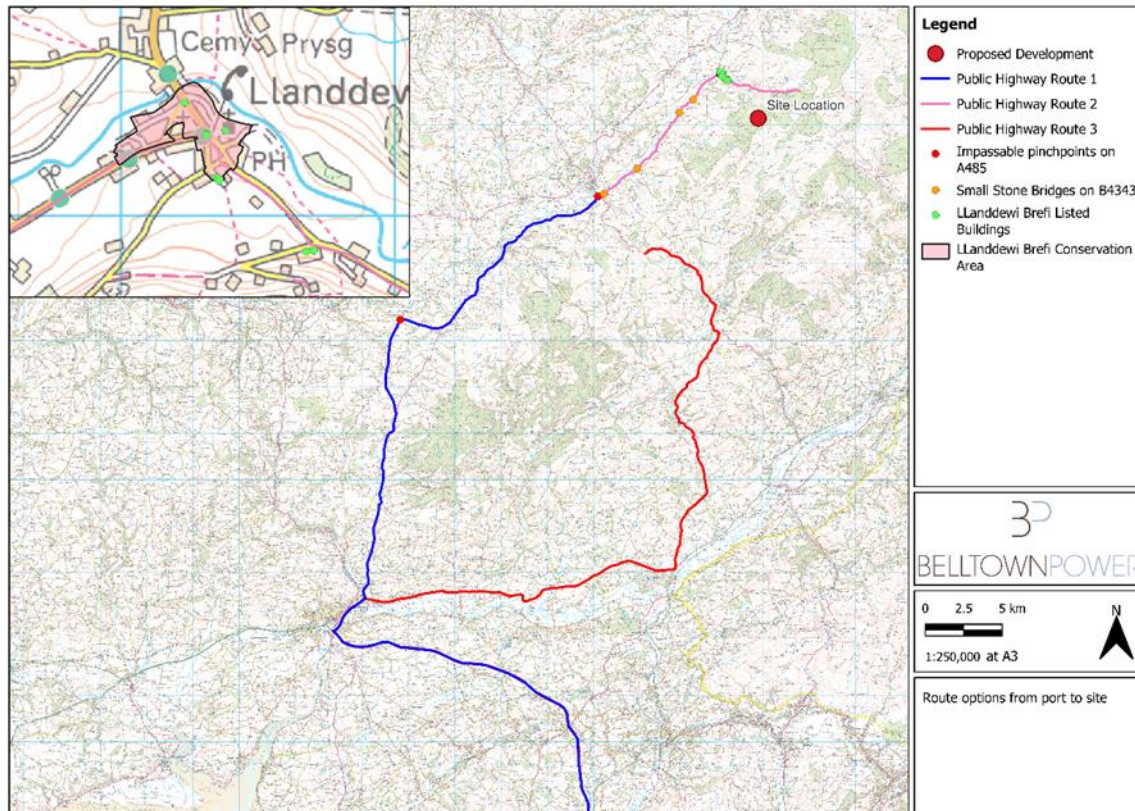


Figure 4 - Public Highway Section Appraisal

2.4 Site Access Track

Once it was determined that the optimal route from port to site was via the A482 from the south, Belltown and consultants Pell Frischmann, identified and analysed three different site access track routes from the A482 and Pumsaint to the wind farm. These options are shown in Figure 5 and summarised below.

2.4.1 Site Track Route 1

Site Track Route 1 was identified with a view to utilise existing public highways as far as possible. Delivery loads would:

- continue west on the A482 through the village of Pumsaint;
- turn right onto the unclassified road at Bryn-eithin and continue north;
- continue north on the unclassified road to the proposed site entrance at Clywedog; and
- From Clywedog, the project would use a combination of forestry tracks and newly constructed, bespoke access track, access rights permitting.

It was found that Site Track Route 1 was infeasible due to the extent of works required. The entire length of the unclassified road (ca. 8.5km) would require widening and reinforcement work, outwith the public highway, which would require significant land-take on both sides of the road and was thus considered economically infeasible as well as having a higher transport impact on other road users during the road widening works.

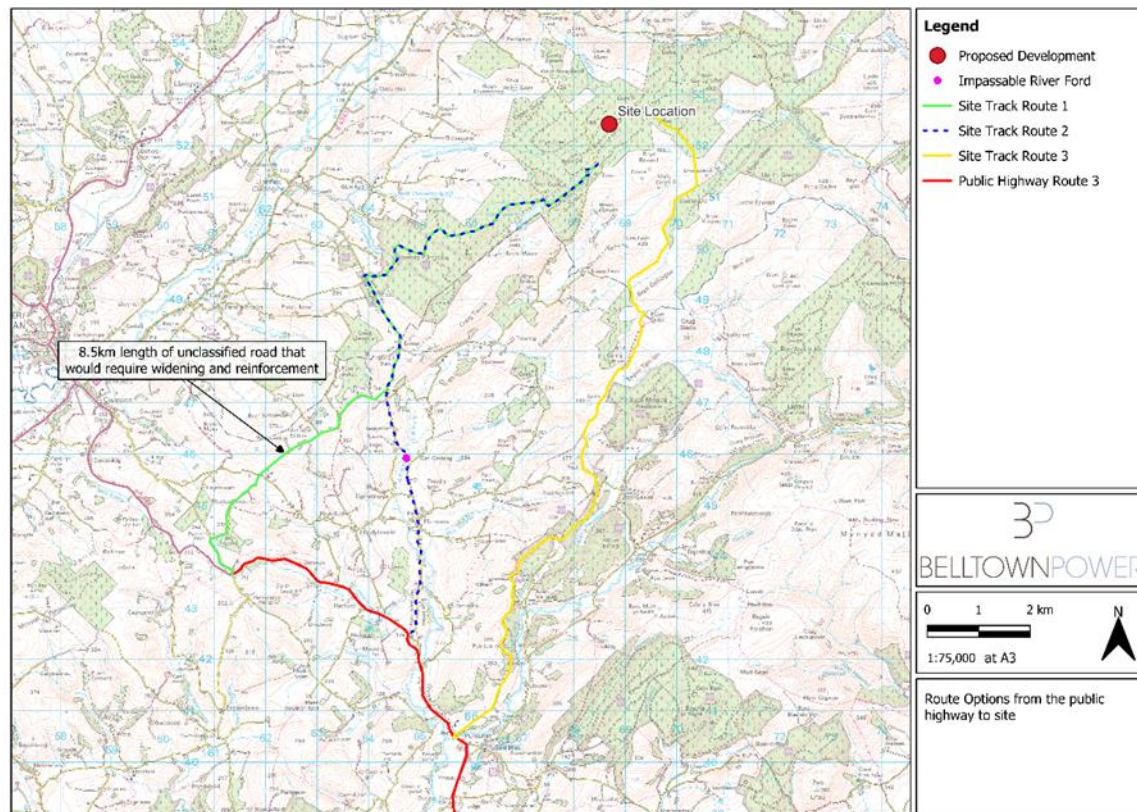


Figure 5 - Routes from the public highway to site

2.4.2 Site Track Route 2

Like Site Track Route 1, Site Track Route 2 looks to utilise existing public highways. Delivery loads would:

- continue west on the A482 through the village of Pumsaint;
- turn right onto the unclassified road at Ty Hir Dderwen and continue north;
- continue north on the unclassified road to the proposed site entrance at Clywedog; and
- from Clywedog, the project would use a combination of forestry tracks and newly constructed, bespoke access track, access rights permitting.

Site Track Route 2 was ruled out for the same reasons as Site Track Route 1 and due to an impassable pinch point – a river ford – for which there was no alternative solution.

2.4.3 Site Track Route 3

Site Track Route 3 was determined as the most feasible option, subject to securing third-party land rights and a detailed review of the works required. Site Track Route 3 uses no public highway, and

instead follows an existing forestry track for ca. 8.5km and a new, bespoke track for ca. 5.5km. Forestry tracks are already designed to carry heavy loads, which means further widening and reinforcement works, and thus environmental disruption, are likely to be limited. Belltown are in preliminary discussions with the National Trust as landowner about the acceptability in principle for the junction road widening.

2.4.4 Other Options

From the options analysis, no other route appears feasible.

2.5 Summary

Belltown and its consultants conducted a route options appraisal to ensure a viable delivery route from port-to-site. The results of our analysis concluded that the only viable option is the route identified in Figure 6, combining Public Highway Route 3 with Site Track Route 3.

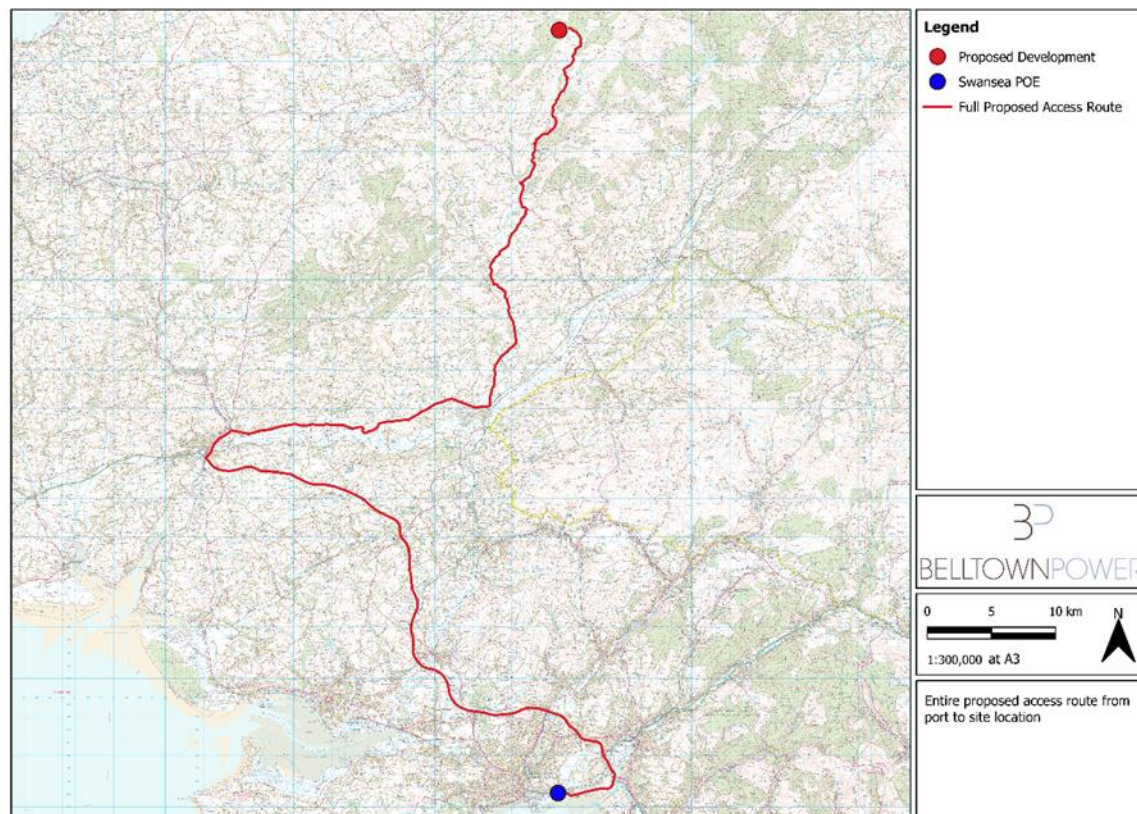


Figure 6 - Full proposed access route from port to site location

3.0 PROPOSED ENGINEERING SOLUTION

3.1 Engineering Solution

Given that the scheduled monument is 0.5m to 0.6m below current ground level and there is a requirement to build up the ground level to meet the public road, to provide a suitable load bearing surface for the wind turbine delivery vehicles, we have considered two options which we believe will protect the monument. Firstly, the solutions avoid disturbing the monument as there is no need to excavate. Secondly, the solutions reduce the applied loads on the monument.

In both solutions proposed, the overrun area is laid directly on top of the ground surface (Appendix A SK01 and SK02). This means there would be no requirement for excavation works or for preparatory topsoil stripping to facilitate construction.

Both solutions could be removed entirely in the future, allowing the scheduled monument to be preserved in its present character, which is currently under soil and vegetation.

3.2 Engineering consideration – Option 1

3.2.1 Floating Track Solution

The construction of a floating track option involves laying protective membrane over the existing ground surface, which would provide a physical separation between the scheduled monument and the subsequent materials used to create the access track.

Approximately 300-400 mm of aggregates (depending on the ground conditions) would be layered in-between 2 layers of geotextile grid. The geotextile grid provides additional tensile strength and would ultimately support the section of track by effectively “pinning” it at each end. This in turn suspends the track, allowing it to float over the scheduled monument. Images of the products can be seen below (Figure 7).



Image 1 - Fabric Separation layer

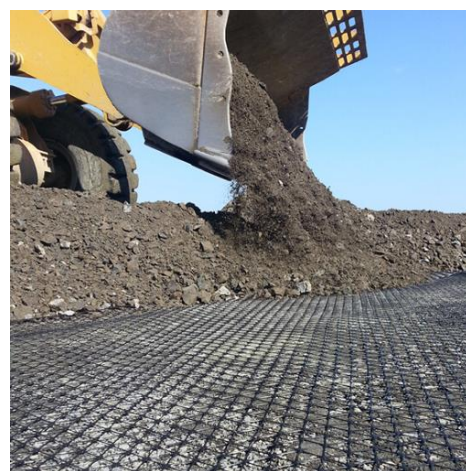


Image 2 – Triaxial geogrid

Figure 7 Materials for floating road construction

This method is used in other construction scenarios to protect the ground surface and sub-surface deposits, like peat, and has been specifically designed to lessen any potential impact from either the construction process or the operational use of the track. This construction method allows for very wet

deep peat to be crossed with minimal impact whilst providing a high bearing pressure for vehicles to pass over the top. Drawing SK03 in Appendix A shows this solution in the location proposed. The floating track could be removed entirely at the point of the Proposed Development's decommissioning.

3.3 Engineering consideration – Option 2

3.3.1 Aluminium Plates option

An alternative solution to the floating track is to install aluminium load-spreading plates. These could be deployed either on their own or in addition to the floating track solution. Having reviewed the topography of the ground adjacent to the public road, there is a requirement to raise the ground level to provide a level running surface. This could either be achieved with the floating track solution (see 3.2.1) or another proprietary system such as ConcertinaWeb Geocell.

The Geocell, would still provide a separation layer to protect the soils below. It also provides a honeycomb containment system which strengthens the subgrade material and ensures there is no material loss of erosion. The aluminium plates would then be installed on top of the prepared surface to further spread the loads of vehicles. Drawing SK03 in Appendix A shows this solution in the location proposed.



Image 3 – Geocell Containment System



Image 4 – Aluminium trackway plates

Figure 8 Materials for alternative floating road

The plates could be removed entirely, following completion of deliveries, with the Geocell or floating track remaining in place until project decommissioning.

4.0 ASSESSMENT

4.1 Heritage significance and potential value

Pumsaint Roman Fort is a nationally important and statutorily protected monument. Its status reflects its strategic role in guarding the river crossing and road in close proximity to the gold mining area at Dolaucothi. Previous investigations have provided valuable information on the historic development of the fort, its plan and morphology, chronology, state of preservation and depth of overburden. This demonstrates the research potential that lies buried within the monument, and the latent value of this resource for future generations.

The small part of the Grade II RPG of Dolaucothi which the road would cross is at the north-western edge of the designation, with a buffer zone for the essential setting to the south. The house and gardens lie a long way to the east, and the extant small patch of roadside woodland which would be affected does not constitute a significant element of the RPG due to its remoteness from the core and the lack of any specific distinguishing features.

4.2 Summary of proposed development

The proposed development comprises construction to widen the existing south side of the road junction so that turbine blades can be transported to the proposed wind farm at Waun Maenllwyd.

4.3 Impact assessment

The proposal for widening the turn from the main road into the forest track superficially risks some potential harm from groundworks which would intrude into the scheduled area and RPG. However, there are engineering designs which can avoid groundworks or physical impact. The zone for widening lies on the south-eastern edge of the scheduled area, just outside but adjacent to the fort defences, an area currently occupied by trees. The two-phase fort lies north and west of the proposed road widening zone, within the existing village which will have affected the preservation of archaeological remains through historic development and current buildings and services. The above-ground visibility and legibility of the Roman fort is virtually non-existent, but an informed observer would be able to appreciate its extent and context despite its current setting.

Based on these factors it is evident that the proposed road widening can be undertaken without physically affecting the monument through construction groundworks. Visually, some change would occur through the loss of trees on the south-eastern edge of the scheduled area and within the RPG, but views towards the fort and from within it towards the river, would continue to be screened by the cottage and vegetation lining the north side of the forest track.

The degree of impact is therefore assessed as negligible. The proposed road widening has an option for a temporary surface which if requested for implementation, would further minimise the visual change to the monument. In conclusion, it is assessed that the increased extent to the forest track and its junction with the main road would not be detrimental to the understanding and appreciation of the ancient monument.

5.0 DISCUSSION AND CONCLUSIONS

5.1 Overview – key points

An options appraisal which examined three access routes to transport turbine blades safely from the port at Swansea to the proposed wind farm has been undertaken, and identified a single viable option. This is via the A482 which passes through Pumsaint. Three access tracks from the main road to the site have been assessed also, and only one is viable. This is via the forest track on the southern edge of Pumsaint. To turn into this track a small zone needs to be widened which would encroach into the scheduled area of Pumsaint Roman Fort. The total area of disturbance would amount to approximately 265 sqm.

Two engineering designs are presented here which would both result in a floating road without the need for groundworks, thus avoiding physical disturbance of deposits within the scheduled area. The heritage value of the scheduled monument lies largely in its buried remains, and therefore the potential impact from the proposed development on these would be negligible or non-existent if this design was adopted. There would be a change to the baseline which might affect appreciation of the fort within its modern setting due to a wider road junction and temporary movement of traffic, including large vehicles turning with associated noise and visual intrusion. However, the degree of impact is assessed as very low adverse.

5.2 Compliance

The appraisal has followed Cadw guidance as presented in Conservation Principles to assess the heritage values and significance of the scheduled monument and how it might be affected by the proposed development. In accordance with Conservation Principles design of the development has managed changes to the existing baseline so that it can proceed without harm to the scheduled monument.

5.3 Recommendations

Engagement with Cadw at an early stage pre-application to discuss the potential floating road option is recommended.

5.4 Conclusions

This appraisal has gathered data on the scheduled monument and the potential impact on it from the proposed development. It has concluded that there would be no harmful impact, and that changes to facilitate the change from the current baseline would allow development which has effectively designed out any significant harm to the scheduled monument.

Appendix A Engineering design for floating road



- NOTE:
1. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION FOR HIGHWAY WORKS AND THE TURBINE MANUFACTURERS STANDARDS AND ALL RELEVANT DRAWINGS WITHIN THE PROJECT DESIGN PACKAGE.
 2. ALL WORKS TO BE EXECUTED IN ACCORDANCE WITH THE DMRB, THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, DESIGN MANUAL FOR ROADS AND BRIDGES, AND TRAFFIC SIGNS MANUAL.
 3. ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE. ALL LEVELS ARE IN METERS AND RELATE TO ORDNANCE DATUM.
 4. DO NOT SCALE FROM ANY DRAWING. WORK TO FIGURED DIMENSIONS ONLY. ANY DISCREPANCIES IN DIMENSIONS ARE TO BE REFERRED TO THE DESIGNER BEFORE WORK IS PUT TO HAND.
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 6. ALL WORKS BY THE CONTRACTOR MUST BE CARRIED OUT IN SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY AT WORK ACT ARE SATISFIED.
 7. ALL WORKS ARE TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENT OF THE STATUTORY AUTHORITIES AND CONSTRUCTION DESIGN MANAGEMENT REGULATIONS.
 8. TO BE READ IN CONJUNCTION WITH STREET LIGHTING DESIGN PACK.

- KEY:
- Proposed Widening
 - Cross Section
 - Existing Contours

DTM data doesn't accurately represent the existing ground at this location.

A topographical survey is recommended to confirm the exact level of existing ground

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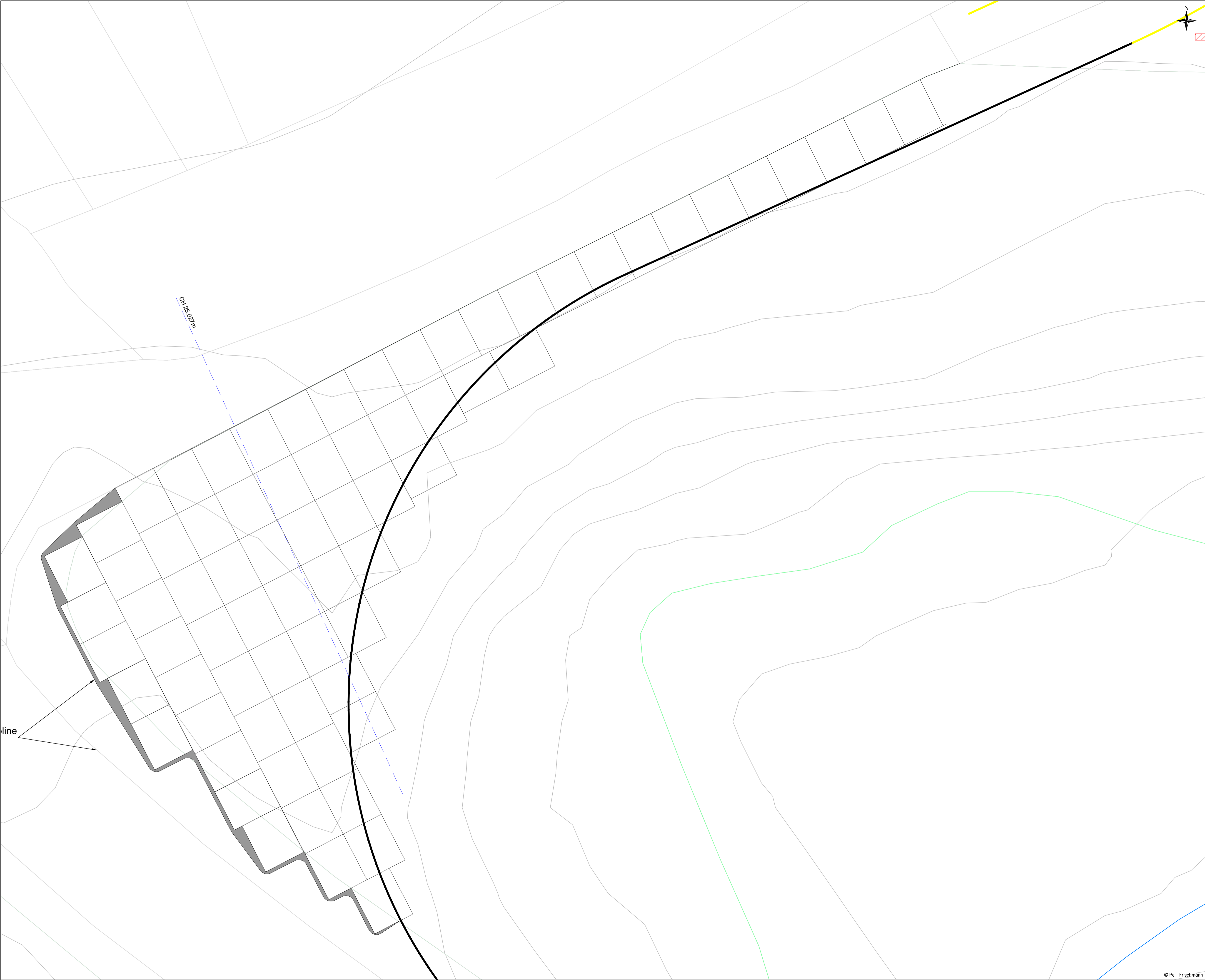
Project

Waun Maenllwyd Wind Energy Hub¹

Drawing Title

Floating Widening

	Name	Date	Scale	Custom	⊗ A1
Designed	JS	05.10.2022	File	Pumsaint Cross Sections	
Checked	SCM	05.10.2022	Drawing Status	DRAFT	
Drawing No.		SK01			Revision P1



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KEY:

- Proposed Temporary Panels
- Cross Section
- Existing Contours
- Proposed Tar Wedge

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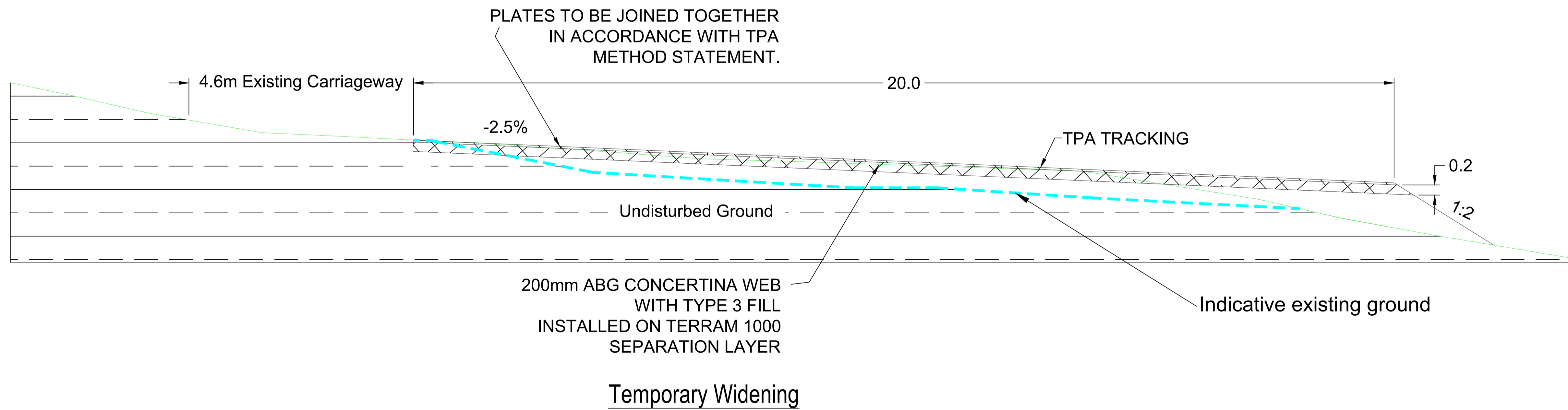
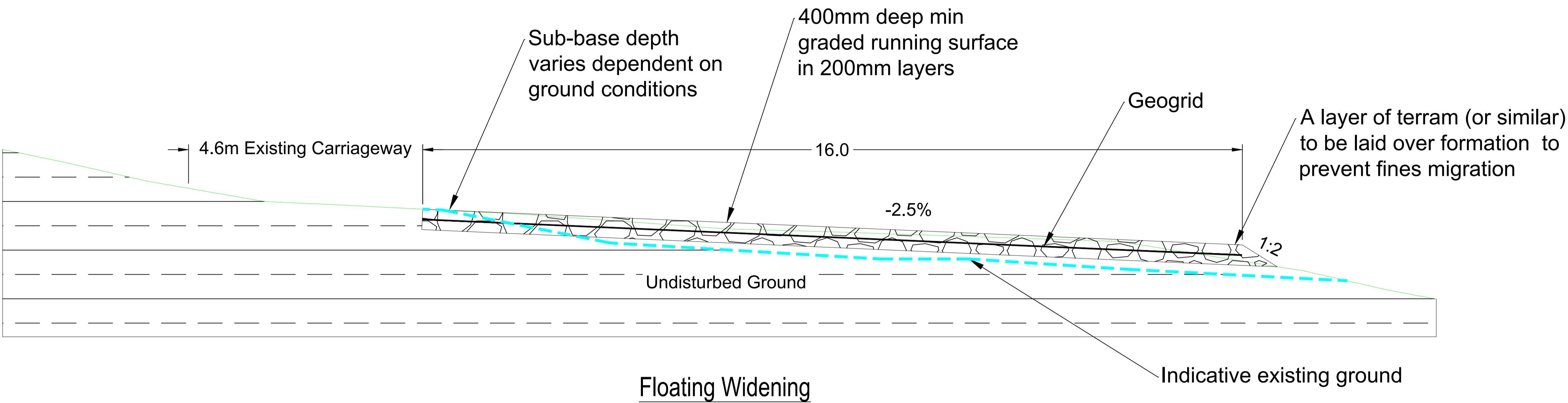
TPA Heavy Duty Temporary Widening

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Designed	JS	05.10.2022	File	Pumsaint Cross Sections	
Checked	SCM	05.10.2022	Drawing Status	DRAFT	
Drawing No.	SK02				Revision
					P1

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- KEY:



DTM data doesn't accurately represent the existing ground at this location.

A topographical survey is recommended to confirm the exact level of existing ground

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Client

Belltown

Project

Waun Maenllwyd Wind Energy Hub'

Drawing Title

Indicative Cross Section Details

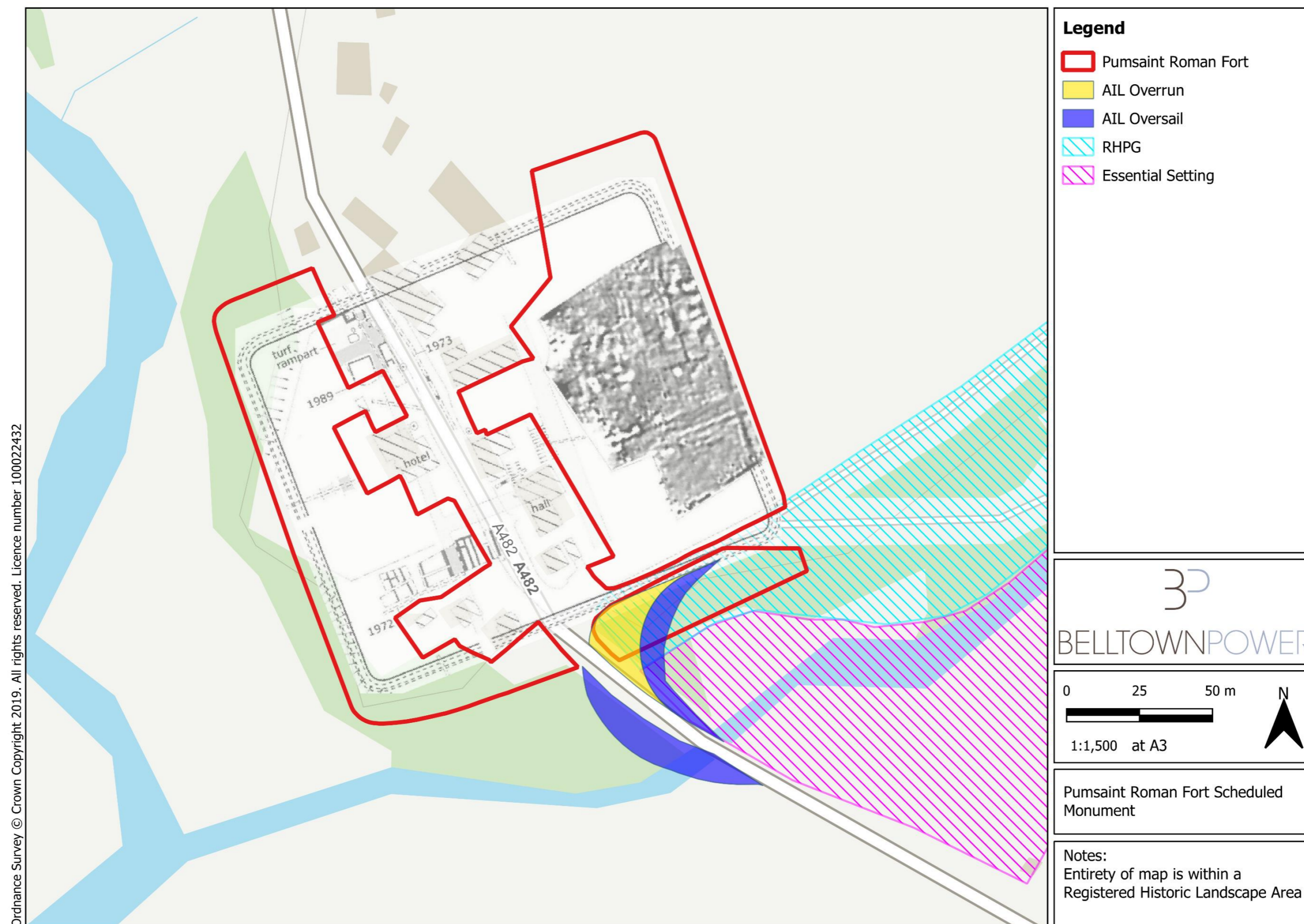
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Designed	JS	05.10.2022	File	Pumsaint Cross Sections
Checked	SCM	05.10.2022	Drawing Status	DRAFT
Drawing No.	SK03			Revision P1



HHD&C
HAMPTON HERITAGE DESIGN & CONSULTANCY

Pumsaint, Roman Fort, Ceredigion
Provisional Heritage Appraisal

DRAWINGS





Heritage Consultancy:

Planning Supporting Statements & Desk Based Studies
Environmental Impact Assessment
Expert Witness
International Heritage Advice
Historic Landscape Assessment
Pre-Planning Heritage Advice
Estate Management Heritage Input



Built Heritage/ Historic Environment:

Historic Building Survey & Recording
Statement of Significance
Written Scheme of Investigation
Conservation Area Appraisal
Heritage Statement and Impact Assessment
Heritage Design Advice
Conservation Management Plan



Archaeological Consultancy:

Archaeological Desk Based Assessment
Written Scheme of Investigation
Archaeological Evaluation
Watching Brief (Archaeological Observation)
Post Excavation Analysis and Recording
Archaeological Survey



Outreach:

Interpretation Panels
Display Designs
Booklets & Leaflets
Lectures, School and Society Talks
Tailored Historic Site Visits
Cultural Tourism



Interior Design:

Concepts for Interior Design
Interior Design
Sourcing Services

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