

# Proposals Paper

for  
RAF Limavady Trainer Dome

Binevenagh and Coastal Lowlands Landscape Partnership Scheme

Hamilton Architects | August 2019

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# 1

## Introduction

- 1.1 This options and proposals document has been developed by Hamilton Architects on behalf of Binevenagh and Coastal Lowlands Landscape Partnership Scheme. They have been developed in conjunction with a Conservation Management Plan (hereafter referred to as the Plan) which sets of a suite of Policies aimed at providing a framework for the future management of the Trainer Dome in order to preserve and/ or enhance that significance.
- 1.2 The principles and policies of the Plan provide a strategic understanding of the Trainer Dome and have been implemented in a set of design options for the structure. These are evaluated against the policies and a recommendation made on the preferred option focussed on the application of the approach laid out in the Plan.
- 1.3 The proposals (up to RIBA Stage 2) – which have been costed and prioritised in an Action Plan – are guided by the policies developed in the Plan, which in turn have been guided by local expertise, knowledge and enthusiasm of stakeholder groups and public organisations to achieve a vision for the future of the Trainer Dome.

### 1.4 Conservation Management Plan Summary

#### 1.4.1 Statutory Designation

The RAF Limavady Trainer Dome is a scheduled monument (LDY00:048), indicating that it is a building of national importance. This designation will have an impact on obtaining Planning Permission for any works as it will require Scheduled Monument Consent.



Figure 1 - The RAF Training Dome from the west – 31/05/2019

#### 1.4.2 *Historic Background*

The Magilligan area has a long history of military use, which appears to have begun with the construction of a Martello Tower on the further reaches of Magilligan Point in 1812. The strategic importance of the area meant that the military presence in the area persisted and, with the use of the Irish treaty ports cut off and a considerable amount of US troops and supply convoys reaching Britain via Northern Ireland, the port of Londonderry became vital during WW2. This led to an increase in military activity in the area including the development of RAF Limavady in 1940 and RAF Ballykelly in 1941.

Military airfields of WW2 had a standard layout. Technical buildings including control buildings and ground signal were grouped together as well as accommodation by rank and squadron buildings. It is likely that the Trainer Dome was constructed after almost all the other RAF buildings and structures were completed as initially the airfield was to be used for training and coastal reconnaissance. The design concept of the Trainer Dome is that images of enemy aircraft are projected onto the interior of the Dome which were fired at by a replica anti-aircraft gun.

Forty-four concrete Domes are known to have been constructed but only six now remain in the UK, making the RAF Limavady a unique and valuable remnant is a rare military building typology.

#### 1.4.3 *Description*

The RAF Trainer Dome at Limavady is a single-storey reinforced concrete hemisphere-framed structure on circular plan and was built in 1942 to the designs of Henry Christian Stephens. The framework of welded steel was fabricated off-site and used as a wire frame to support the poured concrete during construction and reinforced the shell. The finished walls were 112.5mm thick. The interior had a plastered finish and the exterior was cement rendered with a camouflage of tar spray coating over. The reinforced concrete frame sits on a circular concrete projecting plinth with an integrated drip mould to capture rainwater.

There is a single square-headed door opening to the east with a smooth raised rendered surround and reveal. Internally there was a lobby with a cloakroom on one side and a ventilating plant on the other. The internal walls were sound-proofed with a steel-framed internal partition. Inlet and exhausts ports for the plant equipment were located to the right-hand-side of the entrance. The floor is concrete with a cementitious threshold to the exterior.

Much of the historic fabric of the runways, taxiways and buildings survive throughout the airfield, but particularly around the technical group of buildings to the south, where the Trainer Dome is located. These buildings make a significant contribution to the setting of the Trainer Dome and present an opportunity to enhance the broader contextual understanding of the structure. The majority of these buildings remain in reasonable condition; however, they are at risk of loss if action is not taken and several key structures have been demolished in recent years.

#### 1.4.4 *Condition*

In general, the Trainer Dome was found to be in poor condition. Common issues relate to the extensive corrosion of the reinforcement, failure of concrete and the exposure and corrosion of metal lathing, particularly to the interior of the Dome. Externally, the bituminous waterproof coating has largely degraded and disappeared, leading to the exposure of the concrete surface and isolated corrosion of the reinforcement.

Byrne Looby Consulting Engineers has prepared a detailed condition report, which is provided in Appendix 5.2.

#### 1.4.5 *Significance of RAF Limavady Trainer Dome*

The Conservation Management Plan evaluates the heritage values of the Trainer Dome under four broad headings; evidential, historic, aesthetic and communal. The Statement of Significance indicates that the structure is of considerable evidential and exceptional historic value and is of some aesthetic and communal value. The value largely derives from the rarity of the building typology and its associations with the key role Magilligan Point played in WW2.

#### 1.4.6 *Summary of Conservation Policies*

A detailed suite of conservation policies is laid out in the Plan. These are arranged across seven topics;

1. The setting of the Trainer Dome
2. The conservation of the historic fabric
3. The physical built fabric of the structure
4. New work to the Dome
5. Inclusive access
6. Effects on the environment
7. Managing information

A series of focussed policies are set out within the Plan which have shaped the development options and detailed laid out in this document. These policies are directly referenced throughout this document.

# 2

## Options Appraisal

2.1 In developing a set of proposals focussed on preserving and enhancing the significance of the Trainer Dome, several options were explored and evaluated against the conservation policies. Three options have been identified as follows:

- Do nothing;
- Essential conservation works;

and

- Conservation, Interpretation and Access works.

## 2.2 'Do Nothing' option

### 2.2.1 Outline of works

The building will remain in agricultural use, with little or no regular maintenance. The condition of the building will be permitted to deteriorate.

### 2.2.2 Evaluation of 'Do Nothing' option

#### 2.2.2.1 Setting

As no work is being carried out to the surroundings of the Tower, this option fails to address any of the policies relating to the setting of the building. Access will remain restricted and it is likely that the associated airfield buildings in the vicinity, which contribute to the setting and overall contextual understanding of the Trainer Dome, will be lost.

#### 2.2.2.2 Conservation approach to historic fabric

As no work is being carried out, the policies in this section are not applicable. It is notable that policy COF3., relating to the implementation of the Conservation Management, will not be addressed.

#### 2.2.2.3 Building fabric

As no work is being carried out, the policies in this section are not applicable.

#### 2.2.2.4 New work

As no work is being carried out, the policies in this section are not applicable.

#### 2.2.2.5 Inclusive access

This option fails to address the access problems with the structure. As such it is in contravention of all four policies within this section, potentially contributing to a loss of understanding and appreciation of the building and therefore impacting on its communal significance.

#### 2.2.2.6 Effects on the environment

While the environmental impact of the building will not be made worse by this option, nor will it be improved. While an environmental impact assessment has not been completed for the existing building, it can be assumed that its energy performance is currently poor. The failure to address policies EE1. and EE2. will ensure that this poor performance continues. Failing to address EE3. in

relation to water ingress will permit the deterioration of the structure to continue, putting the physical fabric at risk of loss.

#### *2.2.2.7 Managing information*

This option fails to enhance the appreciation of the structure through improved access and interpretation as policy MI1., as does it fail to implement the Conservation Management Plan as policy MI5. and the recommended steps to procure the repair the structure as policy MI6.

#### *2.2.3 Summary of 'Do Nothing' option*

The 'Do Nothing' option fails to address the majority of the policies outlined in the Plan. While there are no direct contraventions of the policies, the consequences of inaction will inevitably lead to the deterioration of the tangible physical fabric of the structure and it's setting leading to the erosion of the intangible significance of the building.

### **2.3 Essential Conservation Works option**

#### *2.3.1 Outline of works*

This option is focussed on works to the building to address issues which resulting in the deterioration of the physical fabric. This includes removal of vegetative growth and animal waste to interior, concrete repairs to plinth, external Dome surface and internal floor screed, new gunite finish to internal surface of Dome, tests to ascertain specification of existing external waterproof coating and provision of new coating to match and the provision of new steel double-door set.

#### *2.3.2 Evaluation of Essential Conservation Works option*

##### *2.3.2.1 Setting*

As no work is being carried out to the surroundings of the Tower, this option fails to address any of the policies relating to the setting of the building. Access will remain restricted and it is likely that the associated airfield buildings in the vicinity, which contribute to the setting and overall contextual understanding of the Trainer Dome, will be lost.

##### *2.3.2.2 Conservation approach to historic fabric*

As the proposed interventions are limited in scope, it should be relatively straight forward to comply with the policies outlined in this section. However, the option fails to address the lack of a viable and sustainable use in accordance with policy COF3.

##### *2.3.2.3 Building fabric*

As above, the proposed interventions are limited in scope so it should be relatively straight forward to comply with these policies. This option is particularly strong on addressing the concerns raised in policy BF8. However, this option fails to address policy BF3., as the repairs are basic and nature and are focussed on preserving the existing fabric rather than enhancing it.

##### *2.3.2.4 New work*

The minimal interventions required by this option are in line with the policies outlined in this section, and the proposed work is particularly compliant with policies NW1., NW2. and NW6.

#### 2.3.2.5 *Inclusive access*

This option fails to address the access problems with the structure. As such it is in contravention of all four policies within this section, potentially contributing to a loss of understanding and appreciation of the building and therefore impacting on its communal significance.

#### 2.3.2.6 *Effects on the environment*

There are opportunities in this option to consider the life-cycle costs of new interventions as policy EE1., and the repair of the concrete structure and reinstatement of the waterproof membrane directly addresses the issues raised by policy EE3. However, as it does not include any site works this option fails to address policy EE4.

#### 2.3.2.7 *Managing information*

This option fulfils policy MI6. and goes some way to address policy MI5. However, it fails to enhance public access and interpretation as required in policies MI1. to MI4.

### 2.3.3 *Summary of Essential Conservation Works option*

The Essential Conservation Works option addresses many of the conservation policies, particularly those relating to the preservation of the existing built fabric. This option, therefore, focuses on the maintenance of the evidential and aesthetic value of the Dome. However, it fails to address many of the concerns relating to the communal value of the structure, with missed opportunities regarding improved interpretation and access.

## 2.4 **Conservation, Interpretation and Access Works option**

### 2.4.1 *Outline of works*

This option takes into account the scope of works as outlined in the Essential Conservation Works option, as well as substantial new works to the building. These include provision of new stud partitions and doors to mimic original layout, provision of toilet facilities, new first floor construction with ladder access to new plant/control room, new heating and air conditioning system and a new electrical installation including internal and external lighting, telecoms, AV equipment, security and fire alarm system. Also included in this option are substantial external works including a new access road, repair to existing concrete paths and provision of several new paths, new security fencing with pedestrian and vehicular access gates, building up of banking around the Dome, improvements to hedging and planting around the site and the addition of interpretation panels, both internally and externally.

### 2.4.2 *Evaluation of Conservation, Interpretation and Access Works option*

#### 2.4.2.1 *Setting*

This option has a significant focus on improving the setting of the building, including significant improvements to access, new external lighting enhancing the appearance and visibility of the building and providing new interpretation in the immediate vicinity of the Dome. As such, this option directly addresses policies SET1., SET3. and SET4. SET2. can only be addressed through careful



consultation with the owners of the adjacent airfield buildings, although the interpretation panels could draw attention to the broader context of the airfield.

#### *2.4.2.2 Conservation approach to historic fabric*

In accordance with policies COF2. and COF3. these proposals have been carefully prepared through consultation with a range of stakeholders, statutory bodies and potential project partners. This has been reinforced by research into the history of the Magiligan area and the Trainer Dome. This level of engagement, both with decision-makers and the local community, should continue throughout the project to ensure the proposals are not only realised, but are fully understood and supported by the community.

The requirements expressed in policy COF1., ensuring that all consultants and contractors are appropriately experienced with historic buildings, should be kept in mind throughout the procurement process and should be reflected in the project documents at RIBA Stage 4.

#### *2.4.2.3 Building fabric*

The nature and extent of interventions to the historic built fabric of the Tower have been carefully considered with a clear focus on minimal, appropriately specified repairs and the retention of all historic features.

In accordance with policy BF3. the original internal layout will be replicated. The requirements of policy BF8. should be addressed in the production information developed through RIBA stages 3 and 4.

#### *2.4.2.4 New work*

The minimal interventions required by this option are in line with the policies outlined in this section. The new proposed layout brings back the original layout of the Dome but is done in such a way as to suit the contemporary use of the Dome, in accordance with policy NW6.

Policies NW1., NW4. And NW5. should be carefully considered to ensure that the new heating, electrical, fire and security systems do not detract from the appearance of the building, and the Mechanical and Electrical consultants should be worked with closely in this regard.

#### *2.4.2.5 Inclusive access*

This proposal addresses policies IA1. and IA4. to the Tower by improving the approach road and enhancing the understanding of the Tower through enhanced interpretation. The development of an access plan as set out in policy IA2. should form part of the development of the project at RIBA Stage 3 and should include careful consideration of traffic and carparking as indicated in policy IA3.

#### *2.4.2.6 Effects on the environment*

There are opportunities in this option to consider the life-cycle costs of new interventions as policy EE1., maximise the efficiency of new services as policy EE2. and to improve the performance of the external fabric through conservation repairs as policy EE3. Additionally, the management of invasive plant species and excessive run off can be addressed through the site works

and new drainage system. It may be prudent to involve an ecologist consultant should any invasive plant species be identified.

#### *2.4.2.7 Managing information*

This proposal presents several opportunities for enhanced understanding of heritage buildings and heritage-led regeneration. In accordance with policy MI2., the improved interpretation signage should form part of a broader interpretation strategy for Magilligan Point considering other defence heritage sites and, potentially, a website focussing on the conservation works to the Tower or the military history of the area.

The requirement of MI5., which states that the Conservation Management be used as a guide to inform any future works to the Dome, should be addressed and enforced by a management and maintenance plan developed as part of the conservation works. The Plan should be considered as a live document, frequently updated as the Trainer Dome is adapted or if any new information comes to light. The requirements of policy MI6. should inform the development of works information over RIBA Stages 3 and 4.

#### *2.4.3 Summary of Conservation, Interpretation and Access Works option*

Except for those policies relating to the long-term management and ongoing maintenance of the building, the Conservation, Interpretation and Access Works option addresses many of the policies outlined in the Conservation Management Plan. However, this option is heavily dependent on identifying a viable and sustainable new use for the Trainer Dome.

### **2.5 Recommended option**

Considering the options evaluations above, the recommended option for the development of the Trainer Dome at this stage is for the Conservation Works. While the Conservation, Interpretation and Access option more fulsomely addresses the policies of the Conservation Management Plan, it is felt that this cannot be executed until a suitable sustainable use has been decided in consultation with the building owner.

As such, the full suite of works as described in the Conservation, Interpretation and Access option has been developed up to Stage 2 in this report, however this has been carefully phased to enable the Conservation Works option to be implemented immediately in order to preserve the Dome and prevent the continued deterioration of the structure. If this does not happen as a matter of priority there is a significant risk that the Trainer Dome will be lost through either neglect, or the Dome being demolished for health and safety reasons.

Consultations with the building owner should continue in order to ascertain a viable sustainable use which will secure the future of the Trainer Dome. In the meantime, partnership opportunities have been identified to support meanwhile uses once proposed conservation works have been undertaken.

# 3

## Proposals

- 3.1 The proposals for the restoration of the RAF Limavady Trainer Dome to enhance its significance, improve awareness, accessibility and learning opportunities about the Trainer Dome and RAF Limavady should be guided by the following:
- Adherence to Conservation Policies as outlined in Section 6 of the RAF Trainer Dome Conservation Management Plan;
  - Best Conservation Practice in relation to ICOMOS International Charters and BS 7913: A Guide to the Conservation of Historic Buildings;
  - A desire to retain the unique form and appearance of the Dome structure and mitigating health and safety issues to prevent their further deterioration;
  - Improving access and providing signage from Downland Road to identify the site.
  - Improving the setting of the Trainer Dome with provision for parking and preservation of the original concrete Limavady Airfield road.
  - The project outcomes as defined by the National Lottery Heritage Fund.

- 3.2 To safeguard the future of the Trainer Dome and gain support for its restoration as an important defence heritage and community structure, a phased development approach will prioritise repairs and new work required without overwhelming the building owner on the financial commitment required for the complete project. This will also allow for further consultation with regards to finding a viable sustainable use for the structure.

It is proposed that, as the structure is concealed from main roads and located within the Industrial Estates, the final use for the building should be a multi-purpose event space rather than a dedicated heritage space to engage the wider community, provide greater opportunity for increased visitors and thus increasing potential for income generation from a sustainable and viable use. The interpretation of Limavady Airfield should also form part of the scheme which will help engage local communities to learn about the significance and the role of the airfield during WW2. The proposals have been developed on this basis and should be revised as and when a suitable reuse is ascertained.

### 3.3 Phase 1

This phase is focussed on health and safety issues prioritised and the preservation of the Trainer Dome fabric to allow safe access for visitors for meanwhile uses.

#### 3.3.1 Conservation measures

The conservation works to the Trainer Dome are focused on repairing and retaining the existing historic fabric. This includes the recommendations as detailed in the structural engineer's report (included in Appendix 5.2). The proposals are as follows:

- Removal of vegetation growth to plinth and external Dome surface as well as animal waste and redundant plant to interior;
- Concrete repairs to plinth, external Dome surface and internal floor screeds;
- Provision of new bituminous waterproof coating to outer surface of Dome, allow for testing of remnants of existing coating to match specification;
- Removal of existing steel framed wall;

- Temporary propping of existing door opening and provision of new double-leaf steel door;
- Power wash internal Dome surface and treat with 50mm gunite Renderoc DS coating with wire mesh reinforcement.

### **3.4 Phase 2 (Associated with Conservation, Interpretation and Access Works Option)**

#### **3.4.1 Work to Trainer Dome**

The works to the Dome are focussed on bringing the Dome back into use. This work will be dependent on deciding on a sustainable and viable new use for the building, so the content of this work is subject to change.

- New stud partitions replicating historic layout of Dome;
- New first floor construction consisting of steel frame and timber joists independent of existing Dome structure;
- New services including provision of WC, light and power, heating and AV facilities.

#### **3.4.2 External Works**

External works are focussed on the improvement of the setting of the building, including accessibility, while trying to limit the visual impact of an interventions. The proposals are as follows:

- Replacement entrance gate and boundary fencing;
- Repair and widen existing concrete access road;
- New tarmac entrance and concrete path from main road;
- New path from access road to Trainer Dome entrance;
- New gate and fence to access road;
- Site works in relation to services;
- New interpretation signage (refer to section 3.5).

The proposed external works should be designed and specified to a high standard using local, robust and appropriate materials to enhance the historic and enhance the setting of the Trainer Dome.

### **3.5 Interpretation strategy**

There is currently no interpretation signage indicating the significance of the Trainer Dome as a unique building typology. An interpretative sign should be located adjacent to the entrance and also on the route from Downland Road introducing the building and its significance to visitors. Interpretation for the following should be considered:

- The historical significance of RAF Limavady and Magilligan Point ;
- History and context of Trainer Domes;
- Military / defence history of Magilligan Point, including contributions to both World Wars;
- Local community significance.

There should be an integrated interpretation strategy which will create a coherent 'brand' for the defence heritage of the Magilligan Area. This will establish a network of defence heritage in Magilligan, leading to an increased understanding of the wealth of significant military sites in the area.

### **3.6 Potential partnerships**

Partnership opportunities should be explored with regards to volunteering, education, tourism opportunities and potential income for the Trainer Dome. Identifying these partnerships should form part of the consultations with building owner when ascertain

potential uses. Partnerships opportunities with a local artist have been identified for meanwhile uses following proposed conservation works to the Dome. Meanwhile uses have the potential to:

- Provide an opportunity for new visitors and increase awareness of the significance of the Trainer Dome;
- Opportunity to market the Trainer Dome as a unique multi-function space;
- Facilitate some interpretation about the Trainer Dome and Limavady Airfield to help make local people more aware of WW2 defence heritage within their community
- Bring the building back into use with the opportunity to identify defects which could comprise the newly conserved structure.

### **3.7 National Lottery Heritage Fund Project Outcomes**

The National Lottery Heritage Fund has identified nine project outcomes against which heritage projects can be evaluated. The proposals outlined in this document have been specifically developed with these in mind. The outcomes have been addressed as follows:

#### **3.7.1 *A wider range of people will be involved in heritage***

As part of the development of these proposals, and the Conservation Management which informs them, a range of community groups and statutory, public and private bodies were consulted. This level of engagement will continue throughout the mobilisation and realisation of the project, with a clear focus on formalising these relationships into partnerships. This will lead to a broad range of public engagement with the project through volunteering and attendance at public events in and around the Trainer Dome.

#### **3.7.2 *Heritage will be in better condition***

One of the primary focusses of the project is to sensitively repair the Trainer Dome and introduce carefully considered improvements to access and service infrastructure. This will not only improve the current condition of the Trainer Dome but ensure that its future condition is safe guarded by ensuring the building has a sustainable use moving forward.

#### **3.7.3 *Heritage will be identified and better explained***

The proposed improvement to the interpretation signage along with the development of an interpretation strategy for the broader area will highlight the rich and, at the moment, largely overlooked defence heritage of Magilligan and RAF Limavady. This will not only draw attention to the unique Trainer Dome structure, but also to the significant amount of remaining airfield buildings, leading to an improved understanding of the WW2 landscape of RAF Limavady.

#### **3.7.4 *People will have developed skills***

The conservation works to the Trainer Dome present an opportunity for heritage skills training relating to the repair of historic concrete structures.

#### **3.7.5 *People will have learned about heritage, leading to change in ideas and actions***

A heightened awareness of the defence heritage of the Magilligan area has the potential to lead to a shared understanding of the military history of the UK and Ireland, desensitising the military's use of the site.

#### **3.7.6 *People will have greater wellbeing***

As above, the desensitising of the ongoing military presence in the area has the potential to lead to increased community cohesion and a shared understanding of the role of Magilligan Point in the defence of the UK and Ireland.

**3.7.7 *The funded organisation will be more resilient***

The project should lead to a series of partnerships across the area, leading to an increased involvement with the Binevenagh and Coastal Lowlands Partnership Scheme.

**3.7.8 *The local area will be a better place to live, work or visit***

The conservation works to the Trainer Dome will enable the structure to host a series of events in and around the structure will attract more visitors. As such, the establishment of a network of defence structures will lead to the area being socially and culturally enriched.

**3.7.9 *The local economy will be boosted***

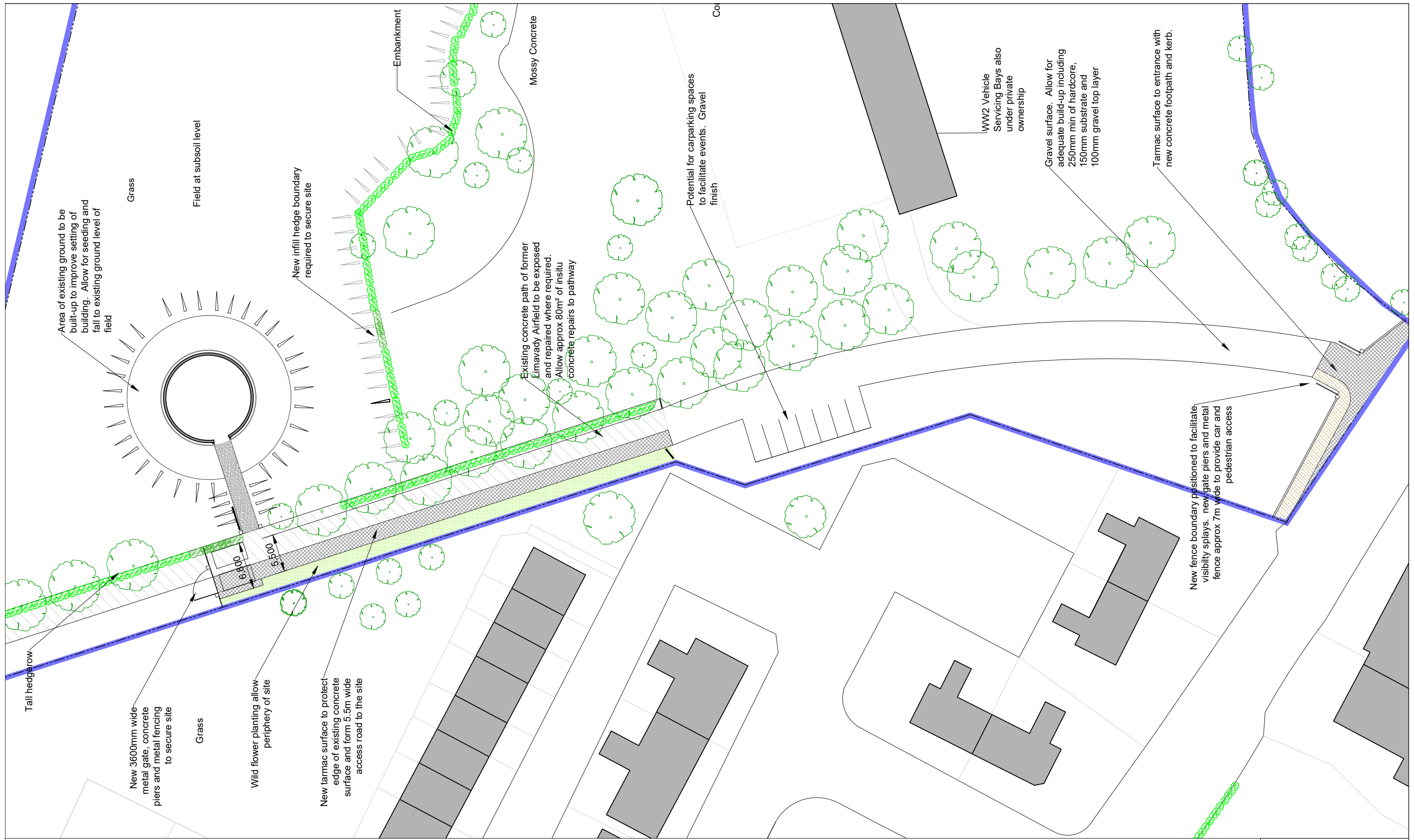
As above, the successful implementation of the project will lead to increased visitor numbers. The establishment of local partnerships as previously discussed will ensure that this new success and prosperity is shared across the Magilligan Area and beyond.

**SECTION 4 REDACTED. PROCEED TO SECTION 5.**

# 5 Appendices

## 5.1 Proposals





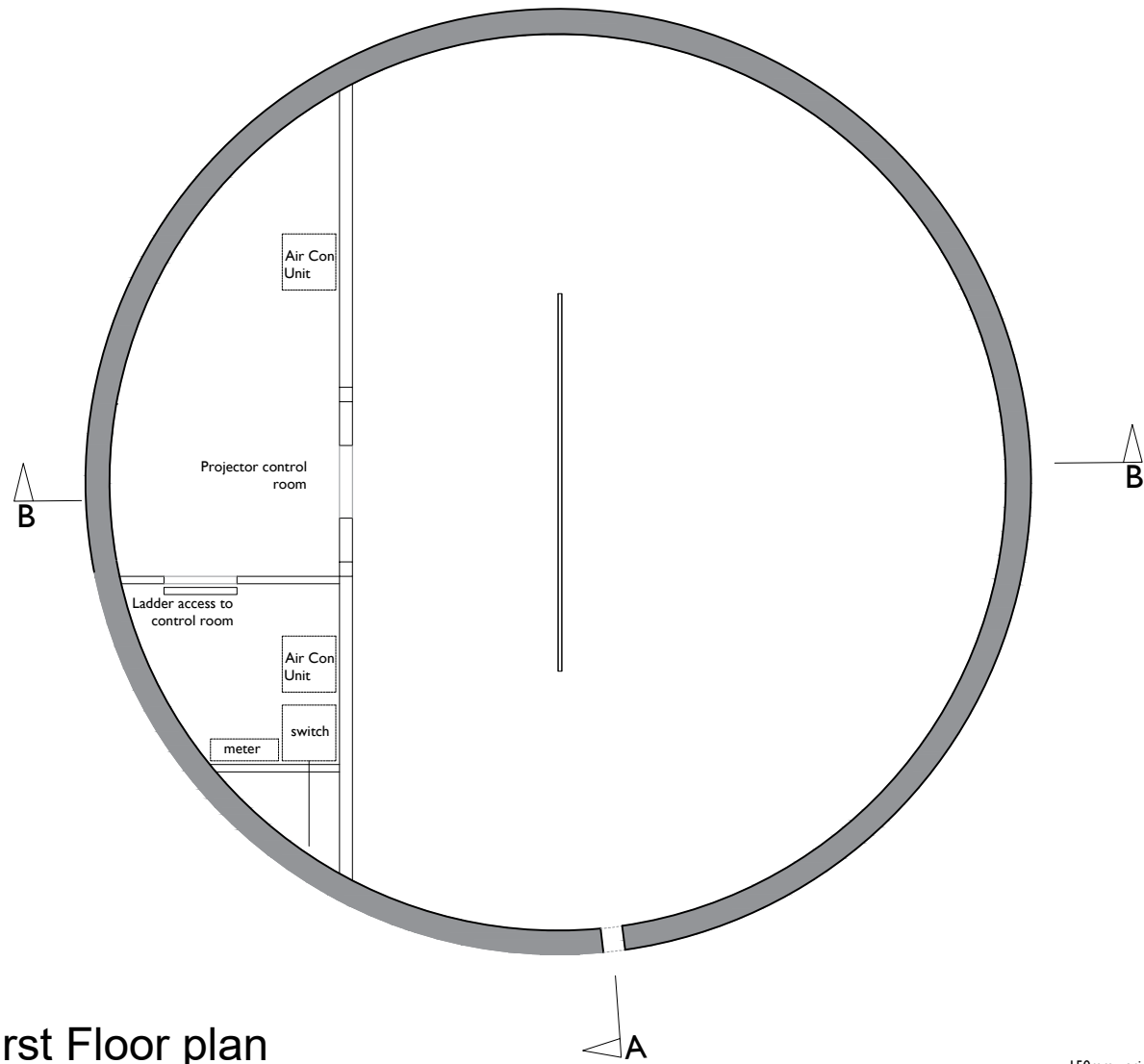
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Binevenagh Coastal Lowlands CMP  
 Binevenagh Coastal Lowlands Landscape P.  
 Proposed Site Plan  
 Trainer Dome

Preliminary	1:500@A3	24/05/2019					
Project No	Originator	Zone	Level	Type	Rate	Number	Rev
19052	HAM	XX	GF	DR	A	(01)	302

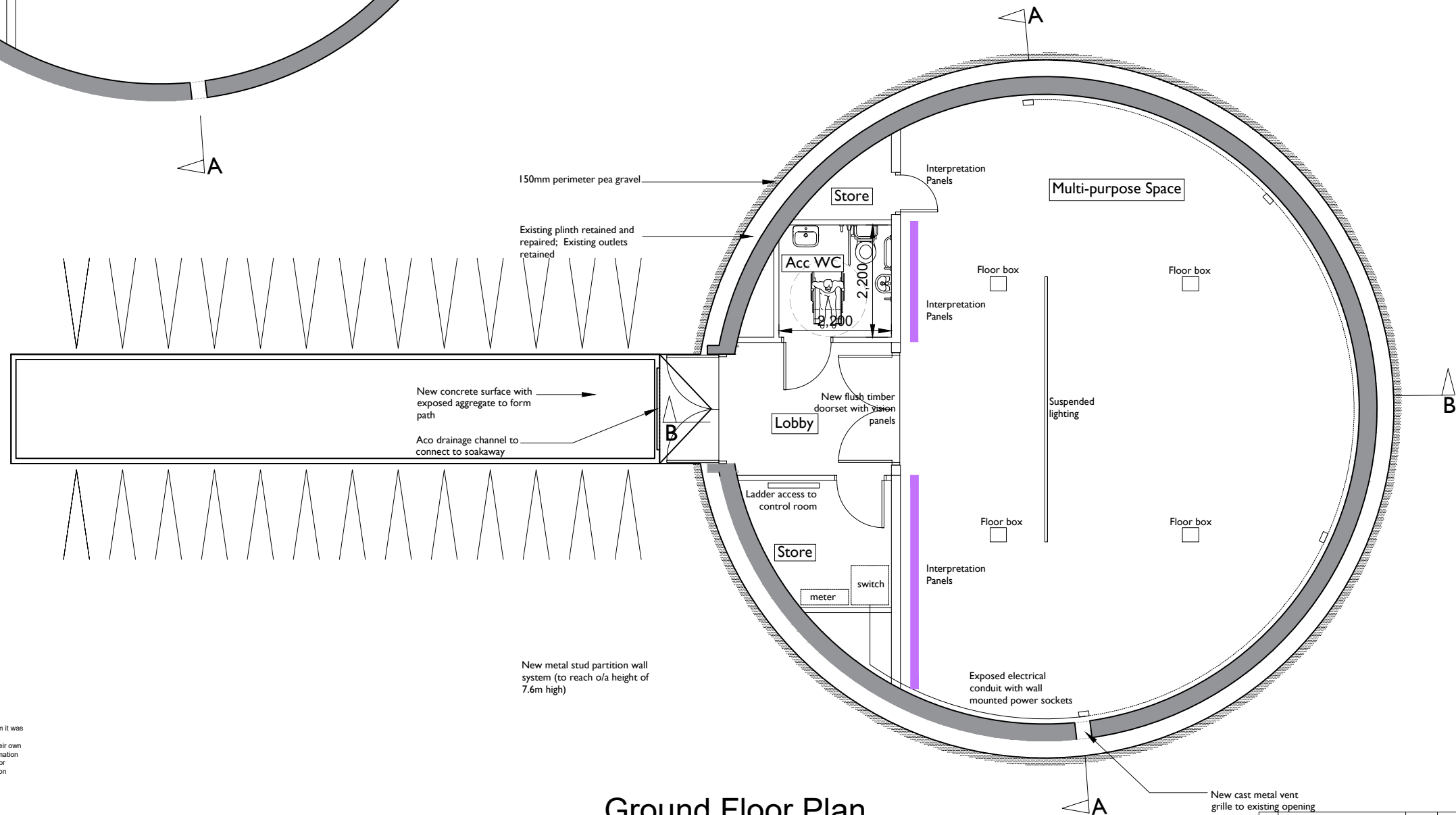
**hamilton**  
ARCHITECTS

No.	Description	Date	Initials	Chk'd



New metal stud partition wall system (to reach o/a height of 7.6m high)

First Floor plan



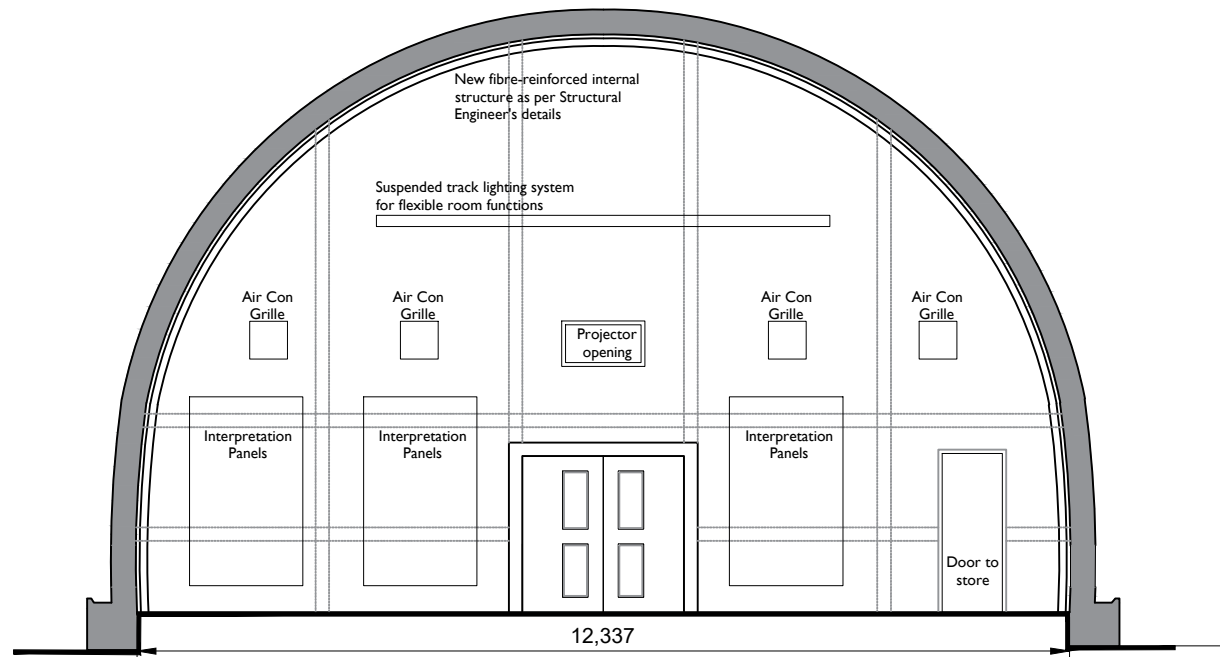
Ground Floor Plan

Notes:

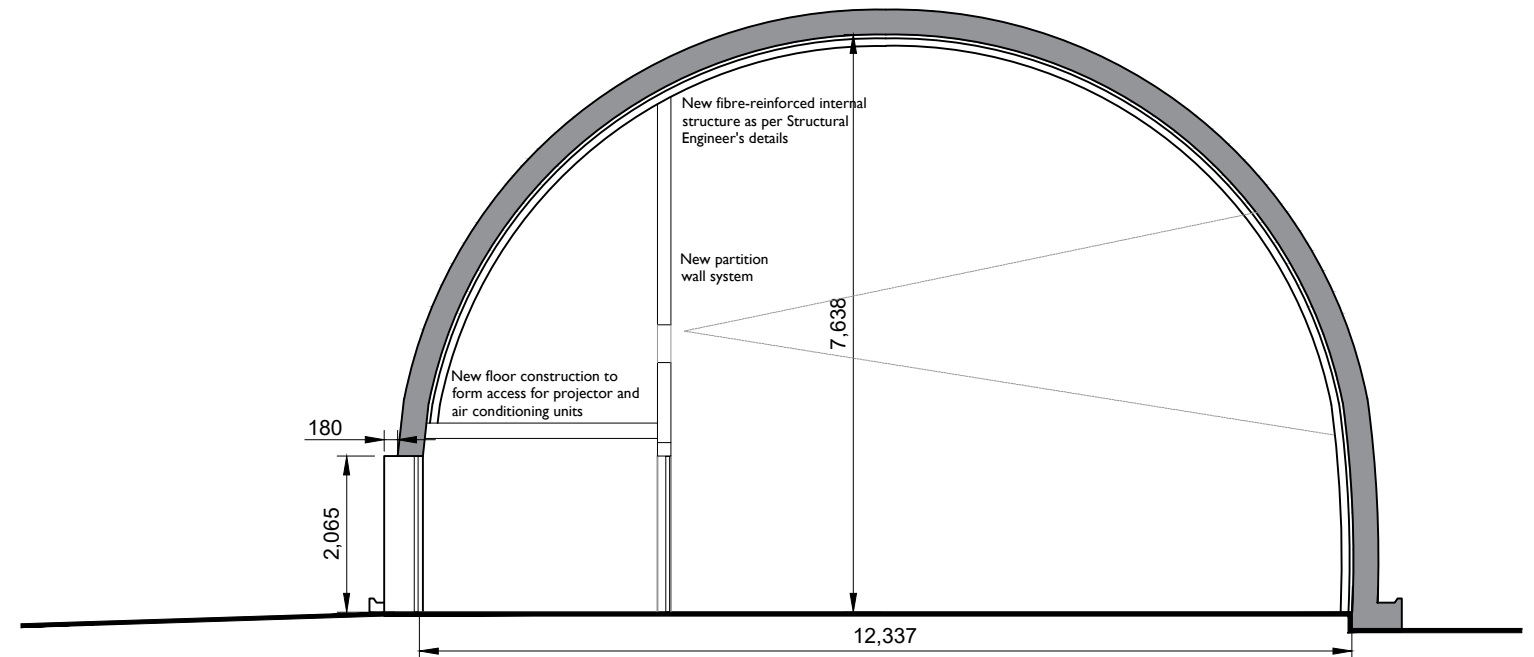
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Binevenagh Coastal Lowlands CMP					
Binevenagh Coastal Lowlands Landscape P.					
Proposed Plan					
Trainer Dome					
Preliminary	1:100@A3	27/06/2019			
Project No	Originator	Zone	Level	Type	Role
19052	HAM	XX	GF	DR	A(01) 303
<small>W: www.hamiltonarchitects.co.uk E: design@hamiltonarchitects.co.uk</small>					

No.	Description	Date	Initials	Chk'd



SECTION A-A



SECTION B-B

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Binevenagh Coastal Lowlands CMP						
Binevenagh Coastal Lowlands Landscape P.						
Proposed Sections						
Trainer Dome						
Preliminary		1:100@A3	27/06/2019			
Project No	Originator	Zone	Level	Type	Role	Number
19052	HAM	XX	GF	DR	A(01)	305
						Rev



## **5.2 Accredited Conservation Structural Engineers Report**

# BYRNE LOOBY



Hamilton Architects

Binevenagh and Coastal Lowlands Landscape Partnership Scheme

Conservation Structural Engineer's Report on: Heavy Anti-Aircraft Base at Magilligan, Pillboxes at Lower Doagh and Grange Beg, Martello Tower at Magilligan Point, RAF Trainer Dome at Former Limavady Airfield

Report No. 9090-CON-001

30 July 2019

Revision 00

**Document Control**

Document: Conservation Structural Engineer's Report on: Heavy Anti-Aircraft Base at Magilligan, Pillboxes at Lower Doagh and Grange Beg, Martello Tower at Magilligan Point, RAF Trainer Dome at Former Limavady Airfield

Project: Binevenagh and Coastal Lowlands Landscape Partnership Scheme

Client: Hamilton Architects

Report Number: 9090-CON-001

File Origin: S:\Standard Documentation\Reports\ByrneLooby\

**Document Checking:**

Revision	Revision/ Review Date	Details of Issue	Authorised		
			Prepared By	Checked By	Approved By
00	30 July 2019	Final issue	TM, DV	T. Meciani	T. Meciani
01	6 August 2019	Minor amendment	DV	TM	TM

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Appendix A – NOTES FROM SITE VISITS, ARCHIVE SOURCES/INFORMATIN, MAPS

Appendix B – PHOTOGRAPHS

## 1 Introduction and Brief

- 1.1 Sinclair Johnston & Partners (now Byrne Looby) were instructed by the Binevenagh and Coastal Lowlands Landscape Partnership Scheme to prepare a Conservation Structural Engineering report to form part of a Conservation Management Plan for various military defence structures in Northern Ireland, dating back to the 19<sup>th</sup> and 20<sup>th</sup> centuries. In this report we are summarising our findings from desk study research of readily available material, archive sources, and our findings and observations from our site visits in May and June 2019. Advice is provided on the condition of the existing structure and any necessary repairs to be carried out in the future.
- 1.2 Both inspections were carried out with Nicola Donnelly of Hamilton Architects. The first visit took place on Friday 31<sup>st</sup> of May 2019. During that visit, we inspected Anti-Aircraft Battery 1 and the Command Centre at the Magilligan site, the Martello Tower at Magilligan Point and the RAF Trainer Dome at the former Limavady Airfield, in Artikelly, near Aghanloo. The visit on the 31<sup>st</sup> was carried out in wet and cloudy weather conditions, during a windy day.
- 1.3 A second inspection was carried out on Friday, the 14<sup>th</sup> June 2019, with the weather being sunny, dry and mild. The structures we inspected during the second visit were the Anti-Aircraft Batteries 2, 3 and 4 and the two Pillboxes (Grange Beg and Lower Doaghs).
- 1.4 The report is based on these visual inspections only, without any trial pits, opening-up or laboratory testing of materials or the like at this time. However, physical investigations may be advised and arranged as considered appropriate.
- 1.5 Marked up drawings with notes from the site visits are included in Appendix A. The drawings used are by Hamilton Architects.
- 1.6 Photographs taken on site are included in Appendix B and are referenced throughout the text as IMG XXXX.



## 5 RAF Trainer Dome, former Limavady Airfield

### 5.1 HISTORY AND EXISTING STRUCTURE

- 5.1.1 The RAF Trainer Dome (IMG 6121 and IMG 6135) is located in the former Limavady Airfield, south of Artikelly. The area is now a zone of mixed industrial and residential use. The site is privately owned and also comprises other former military buildings. Limavady Airfield opened in 1940 and stopped being used by the military in 1958. It was one of four airfields in the area, securing the city of Derry against enemy military attacks. The other three were Ballykelly, Eglington and Maydown Airfields to the W-SW. Airfields in that part of Ireland were also of great importance for planes with supplies from the United States which needed to refuel. They were also safer from attack from Germany compared to other airfields to the south and south-east. Maps with the location and the original layout of Limavady Airfield, location of other airfields in the area, and the expected ground conditions on site are included in Appendix A. The RAF Trainer Dome is a Scheduled Monument.
- 5.1.2 RAF trainer domes started being built in the late 1930s and early 1940s for the training of military personnel for use of anti-aircraft equipment. There were different types of domes; some built in steel and plaster, others in timber, and even inflatable 'Portobel' domes. The dome in Limavady Airfield was built with reinforced concrete. The term 'dome' for the RAF structure in Limavady is not entirely correct as although initially built as domes, these structures were later changed to having a cylindrical lower part and a dome on top. However, and for the needs of this report we will keep referring to it as a 'dome'.
- 5.1.3 One of the first structures of this type in concrete was designed and built by the Trussed Concrete Steel Co. Ltd. in 1942 and later adopted by the Air Ministry in 1942. The dimensions of that 'prototype' dome are given as 25ft high and 40ft internal diameter, therefore very similar with the dome in Limavady. Approximately 43 permanent domes were built in the UK, with 6 surviving now.

- 5.1.4 The small entrance lobby was separated from the training area by a partition of welded rods with sound insulation and wire netting (IMG 6098). The lobby originally had a plant room and a cloakroom.
- 5.1.5 The dome at Limavady is a reinforced concrete structure cast in situ. The reinforcement comprises a grid of ribs (vertical elements) and hoops (horizontal elements) of prewelded steel rods. The width of the ribs is approximately 150mm and the zig-zag prewelded rods are welded at 250mm pitch (IMG 6023).
- 5.1.6 According to Anti-Aircraft Dome Instructor General Arrangement record drawing No. 73/42 from the Directorate of Works (Appendix A), light metal lathing was wired internally and externally to the ribs and hoops on site to form a temporary shuttering for the concrete and permanent reinforcement for the entire shell (IMG 6029). This was a Hy-Rib type of steel lathing, a proprietary product used at the time. On the record drawing the external layer of lathing is shown not extending to the top of the dome. The width of the metal lath strips was measured to be approximately 100mm.
- 5.1.7 The rough key of the concrete through the lath was then cement rendered externally and probably internally to form a smooth finish and eventually the dome was covered externally with a tar coating with stone chippings or chopped heather for camouflage with maximum density to the top of the dome. During our visit we noticed rectangular pieces of wood still in place in small recesses in the lathing (IMG 6114). They were originally providing fixing locations for the internal plaster lining which is now lost. The external waterproof/ camouflage coating of the dome at Limavady probably comprised stone chippings.
- 5.1.8 According to the record drawing, the thickness of the concrete ground floor slab is 100mm with a hardcore layer of same thickness under. Channels are shown to be cast into the floor for services of the equipment. The concrete slab has a thickening around the perimeter forming a strip footing under the walls of the dome, while also accommodating a recessed gulley. The perimeter gutter for rainwater drainage is present around the dome at Limavady (IMG 6125). According to drawing 73/42, there are two diametrically opposite drains for the discharge of rainwater which we did not see on site due to vegetation.

5.1.9 From a small opening in the dome structure we measured a thickness of approximately 140mm (IMG 6009). The total thickness (including the lost cover) would have been approximately 160mm. The height of the dome in the centre is approximately 7.6m and the diameter at the base 12.3m.

## 5.2 CONDITION OF EXISTING STRUCTURE - NOTES FROM SITE VISIT

5.2.1 The dome at Limavady is in poor condition. The fact that the cover to the reinforcement was very limited, and the lack of maintenance and care of the structure have led to a long period of neglect and decay which have taken their toll on the fabric and structure.

5.2.2 The common issues we encountered were extensive corrosion of the reinforcement, loss of all the internal cover of the reinforced concrete dome, and weathering and loss of the external waterproofing.

5.2.3 The first observation when looking at the dome after walking through the entrance is that the entire concrete cover to the lath has collapsed and taken rusted pieces of the metal lathing to the ground. All the concrete fragments and pieces of the steel lathing have been pushed around the perimeter (IMG 6058) and a large part of the floor is covered with animal excrements as the interior was used as a stable.

5.2.4 The loss of all the internal cover due to corrosion of the steel reinforcement has exposed not just the metal lathing but also significant areas of the ribs and hoops of reinforcement (IMG 6035 and IMG 6038). All the main steel reinforcement and lathing we looked at internally were corroded.

5.2.5 Externally, the original bituminous coating on the surface of the concrete has largely weathered and disappeared. The concrete surface underneath is visible in many areas together with some areas of corroded external metal lathing (IMG 6067 and IMG 6071). The reason the external concrete cover is still in place is mainly due to this being on the extrados of the dome.

5.2.6 The perimeter concrete gutter outside the dome is in many locations covered in vegetation preventing the flow and drainage of rainwater (IMG 6074).

### 5.3 PROPOSED CONSERVATION MEASURES - RAF TRAINER DOME, FORMER LIMAVADY AIRFIELD

5.3.1 The dome at the former Limavady Airfield appears to be in poor condition. The internal and external metal lathing is severely corroded, all internal concrete cover to the reinforcement is lost and the external tar layer of camouflage/ waterproofing is weathered and lost in most areas. Some of the main ribs and hoops of reinforcement are exposed internally and corroded as well.

5.3.2 The approach for the repairs to the dome in comparison with repairs to the HAA site at Magilligan will be very different because of the scale of the building, the extent/ magnitude of corrosion and the type of the reinforcement.

5.3.3 The structure has been standing on the site for more than 70 years, albeit neglected and in a state of disrepair for a long period. The form of the structure has helped the building retain its external cover to the reinforcement.

5.3.4 The first and most important measure to be undertaken should be to make the structure waterproof. The existing bituminous coating is largely lost, but samples could be taken for laboratory analysis. The loose concrete sections to the external face should be cleaned and recast, and a new layer of waterproofing should be applied to encapsulate the full external surface of the dome. The material to be used and the precise specifications would be given by the architect, the compatibility and reversibility being key for the works.

5.3.5 The repair of the internal part of the reinforced concrete dome is more challenging. The cover is lost and all the lathing and main reinforcement visible are corroded. Clearly a system of patch repairs is not applicable, and the cleaning and reinstatement of all reinforcement is probably ineffective. The thickness of the RC dome minus the lost internal cover is approximately 140mm, and the lost cover was measured to be between 15 and 20mm. Probably the most feasible option, from a buildability point of view, would be to use sprayed concrete to reinstate the internal part of the dome. That can be formed by shotcrete or gunite (sand-cement mortar) and carefully treated to provide a smooth finish. Within the internal concrete layer, we could incorporate fibre reinforced polymer strips attached to the internal surface of the dome. Although trying to avoid an increased

thickness, in this case this is most likely unavoidable, although the total thickness of the new concrete/ mortar would probably not exceed 45-50mm.

5.3.6 An option that has been applied to another reinforced concrete RAF Trainer dome of very similar construction was the use of a cathodic protection system to prevent further corrosion of the reinforcement and is another way that the corrosion issue could be dealt with.

### RECOMMENDED INVESTIGATIONS AND LABORATORY TESTING TO DECIDE ON REPAIR STRATEGY

5.3.7 Prior to reaching a decision on the preferred conservation approach for the Trainer Dome, further investigations and tests should be carried out to get a better understanding of the condition of the structure. These should include the following:

- Full visual survey and report to include full schedule of defects and a systematic recording of existing structural details
- Laboratory testing of concrete for carbonation and chloride content
- Laboratory testing to determine concrete composition
- Laboratory testing to confirm the composition of the original waterproofing/ camouflage layer

5.3.8 Depending on the results and findings of the investigations and testing of the materials regarding the state of decay of the structure, the project could be taken forward in two ways:

- Conservation of the fabric, painting the reinforcement with corrosion protection coatings, external waterproofing, recasting (or not) internal lost cover of concrete, or,
- In case the damage/ decay is of greater extent and the structural stability and performance have been compromised, retrofitting the existing structure would be necessary. Retrofitting could, for example, involve the use of Fibre Reinforced Polymer materials to offer the structure a 'helping hand' and prolong its life.

Conservation Structural Engineer's Report on: Heavy Anti-Aircraft Base at Magilligan, Pillboxes at Lower Doagh and Grange Beg, Martello Tower at Magilligan Point, RAF Trainer Dome at Former Limavady Airfield

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*Conservation Engineer*

APPENDIX A

MARKED UP DRAWINGS WITH NOTES FROM SITE VISITS, ARCHIVE

SOURCES/INFORMATION, MAPS



Image 11 - Location of the former RAF Limavady Airfield in Northern Ireland (extract from Bing maps)



Image 12 - Location of the former RAF Limavady Airfield (extract from Bing maps)





Image 13 - Location of RAF Trainer Gunner Dome in the former Limavady Airfield (extract from Bing maps)

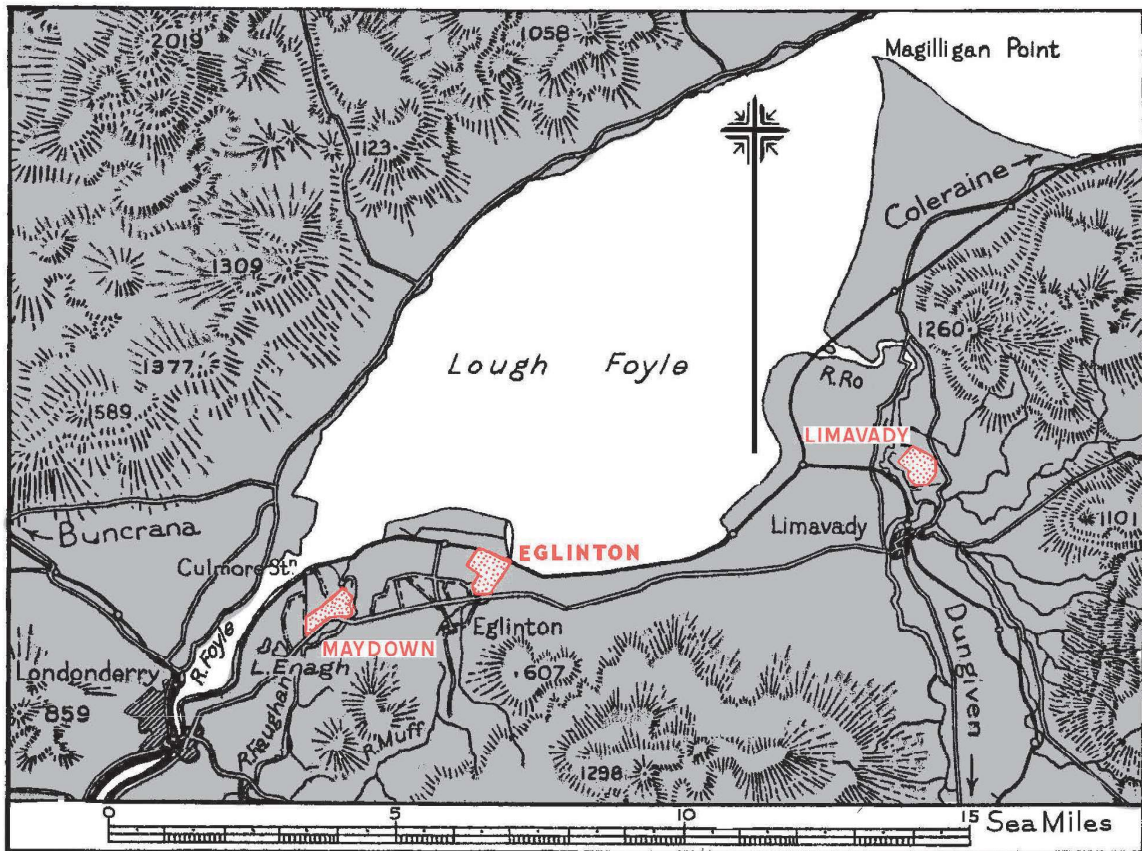


Image 14 - Map of RAF Airfields around Lough Foyle

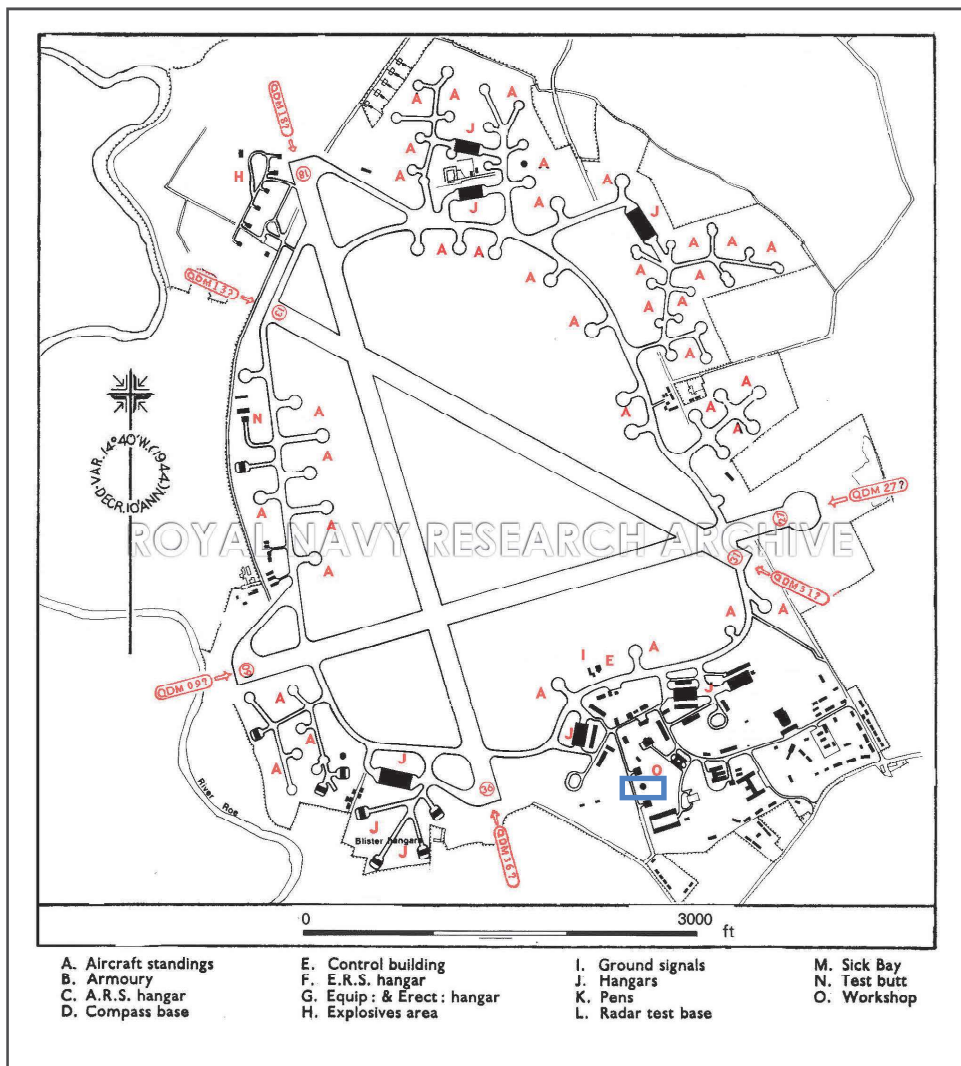


Image 15 - Map of Limavady Airfield (from the Royal Navy Archive) - the Dome shown in the blue box

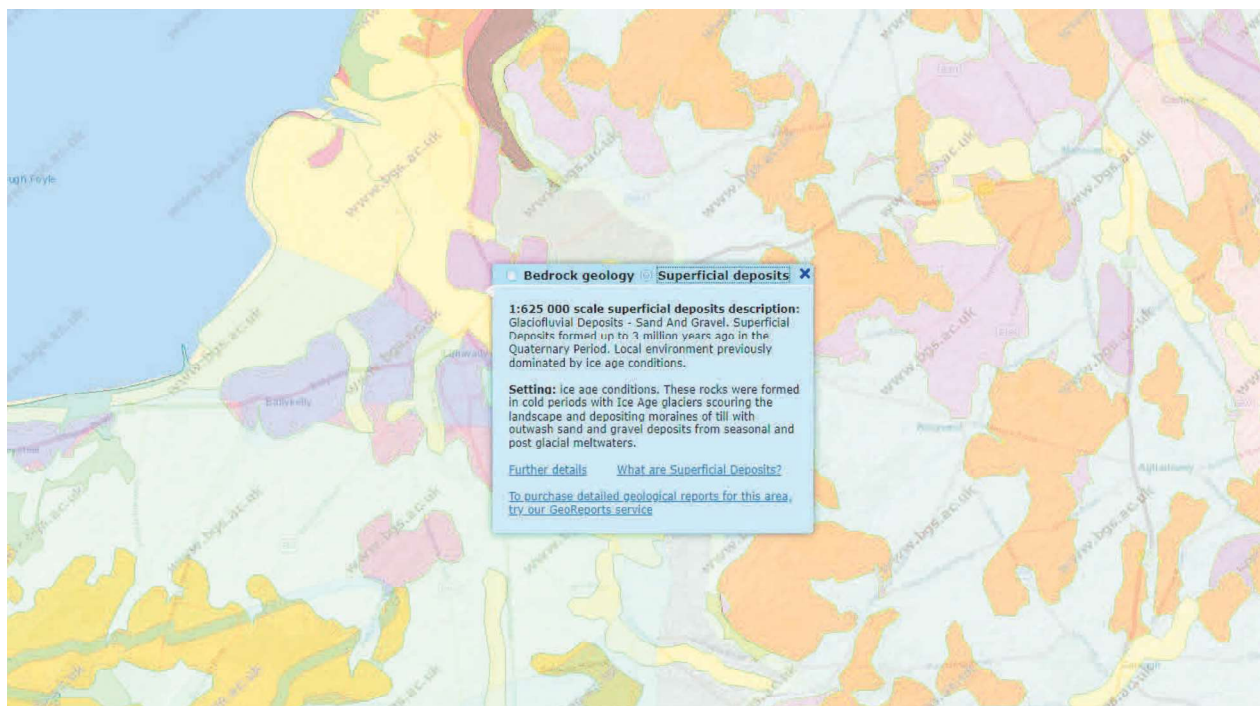
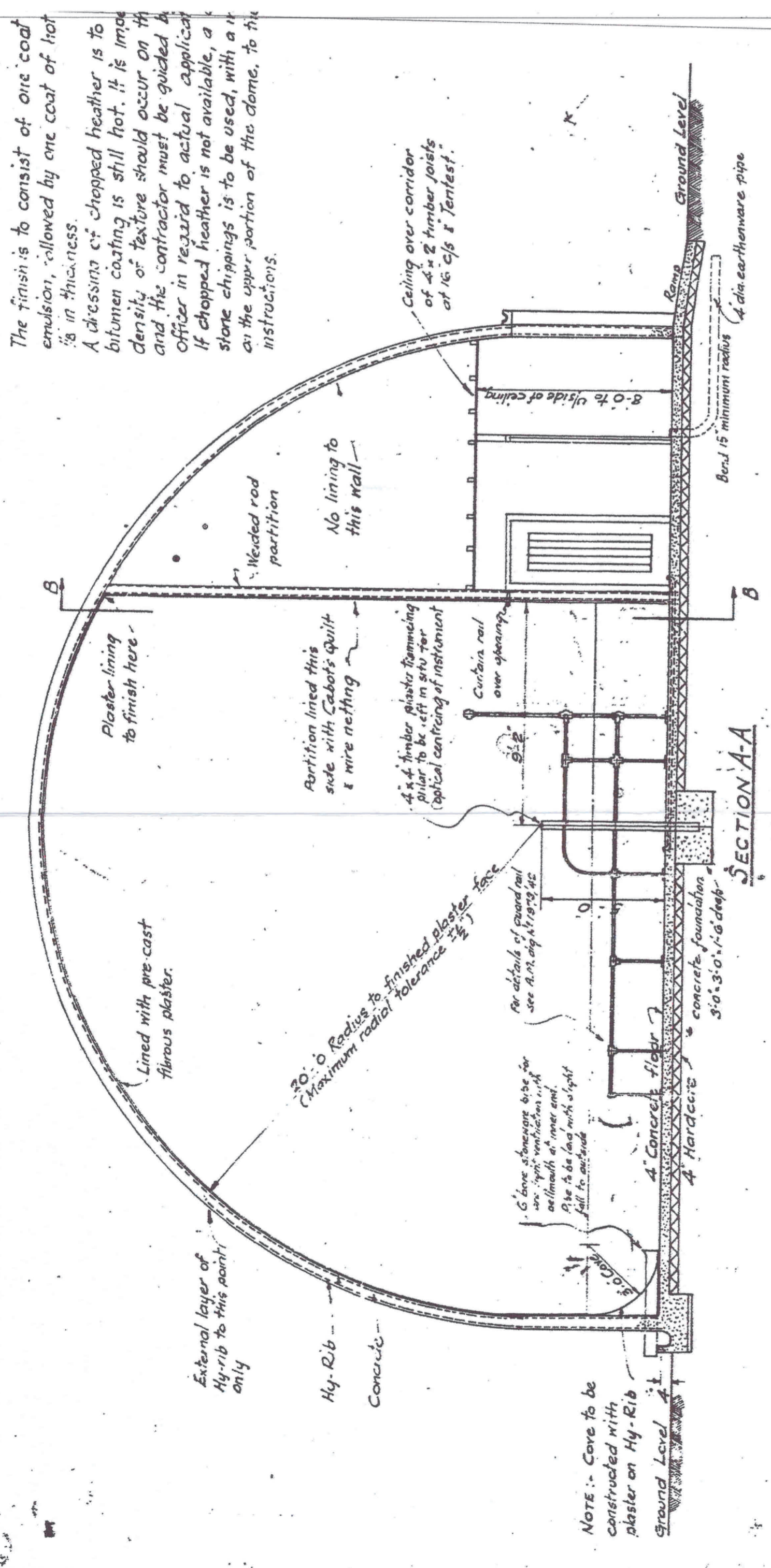
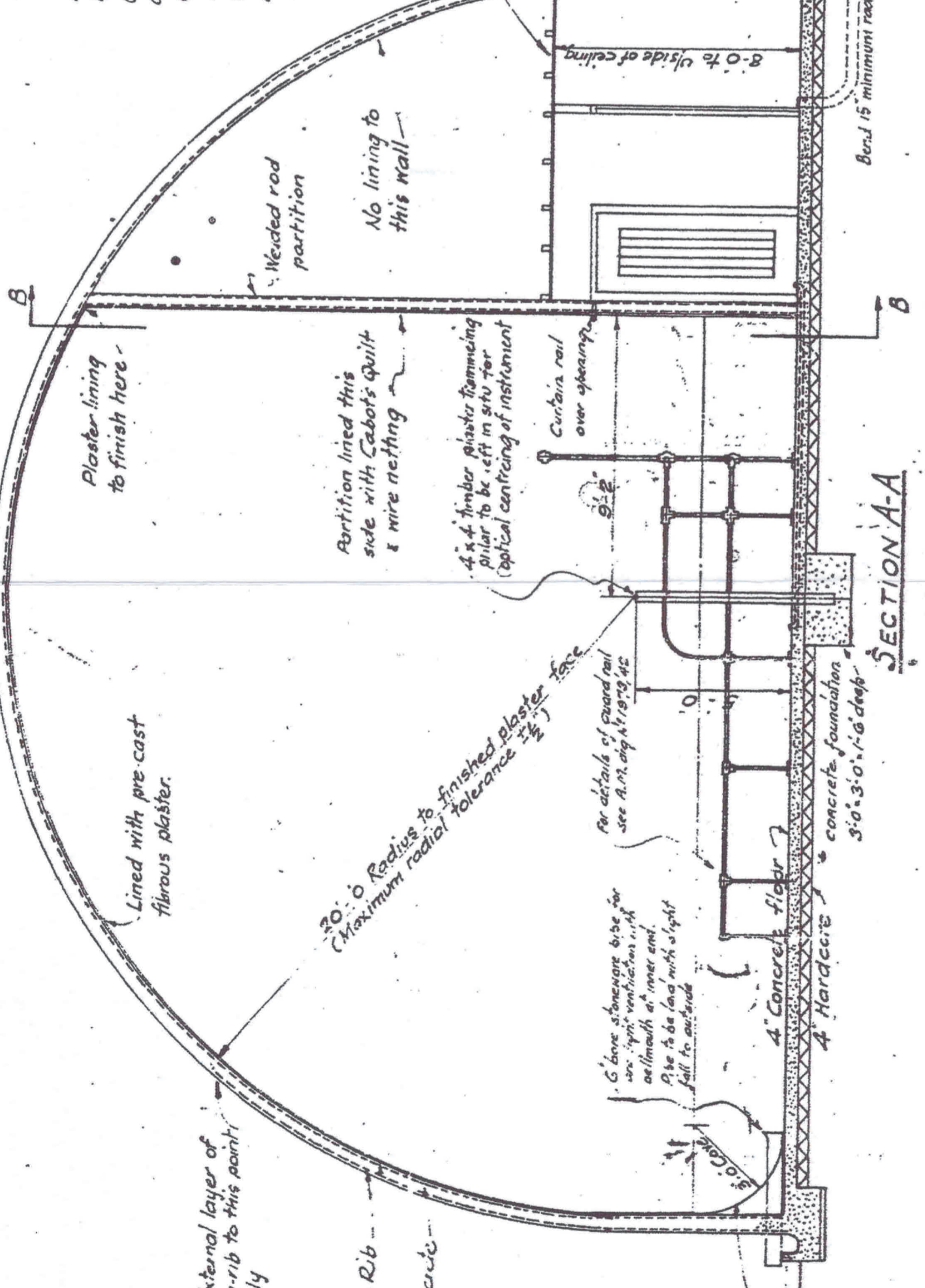


Image 16 - Extract from the British Geological Survey map of the area

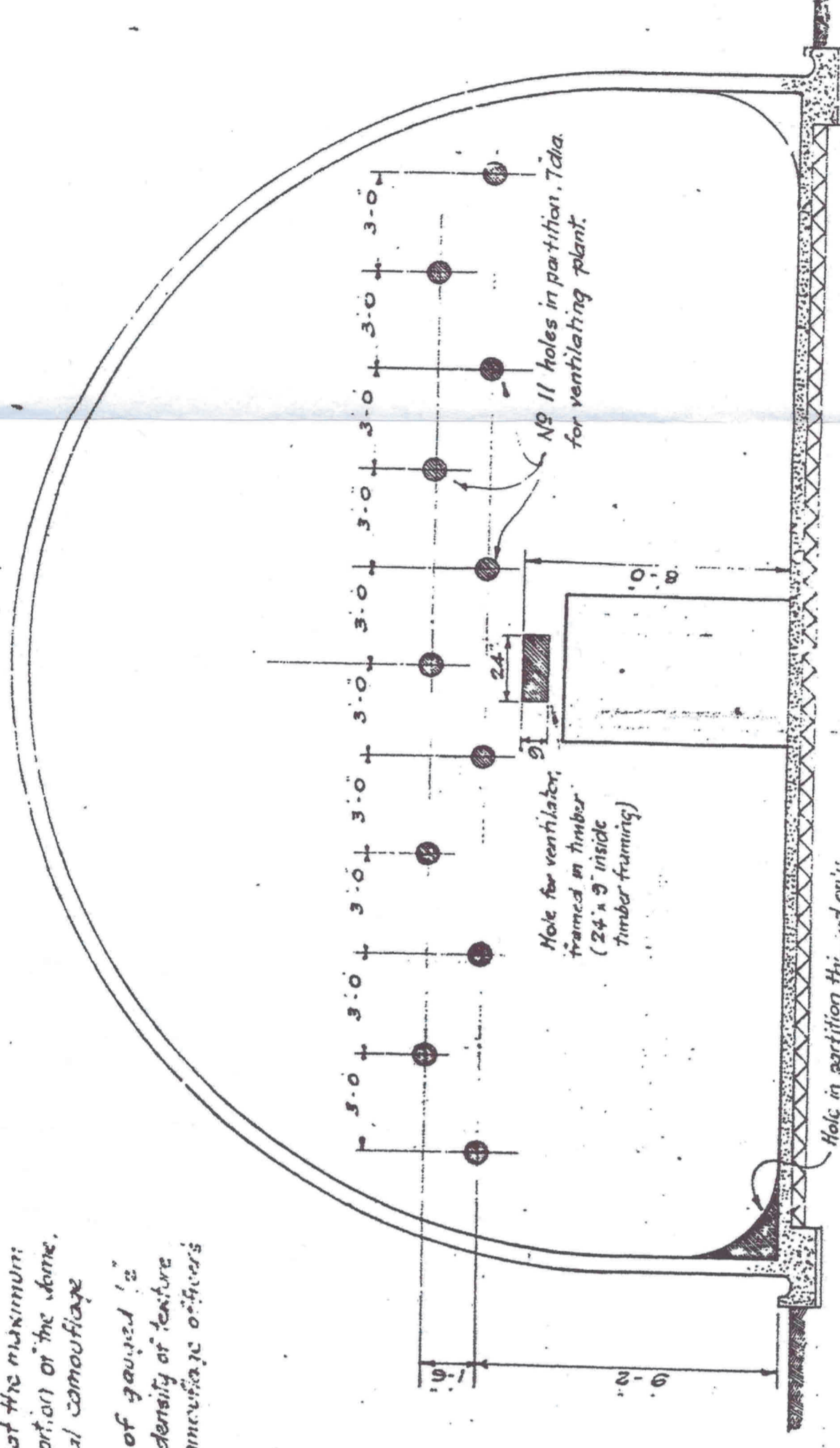
The finish is to consist of one coat of approved bituminous emulsion, followed by one coat of hot iron, approximately 1/8" in thickness. A dressing of chopped heather is to be applied while the bitumen coating is still hot. It is important that the maximum density of texture should occur on the inner surface of the dome. The contractor must be guided by the officer in regard to actual application of chopped heather. If stone chippings are not available, a minimum density of texture on the upper portion of the dome, to the instructions.



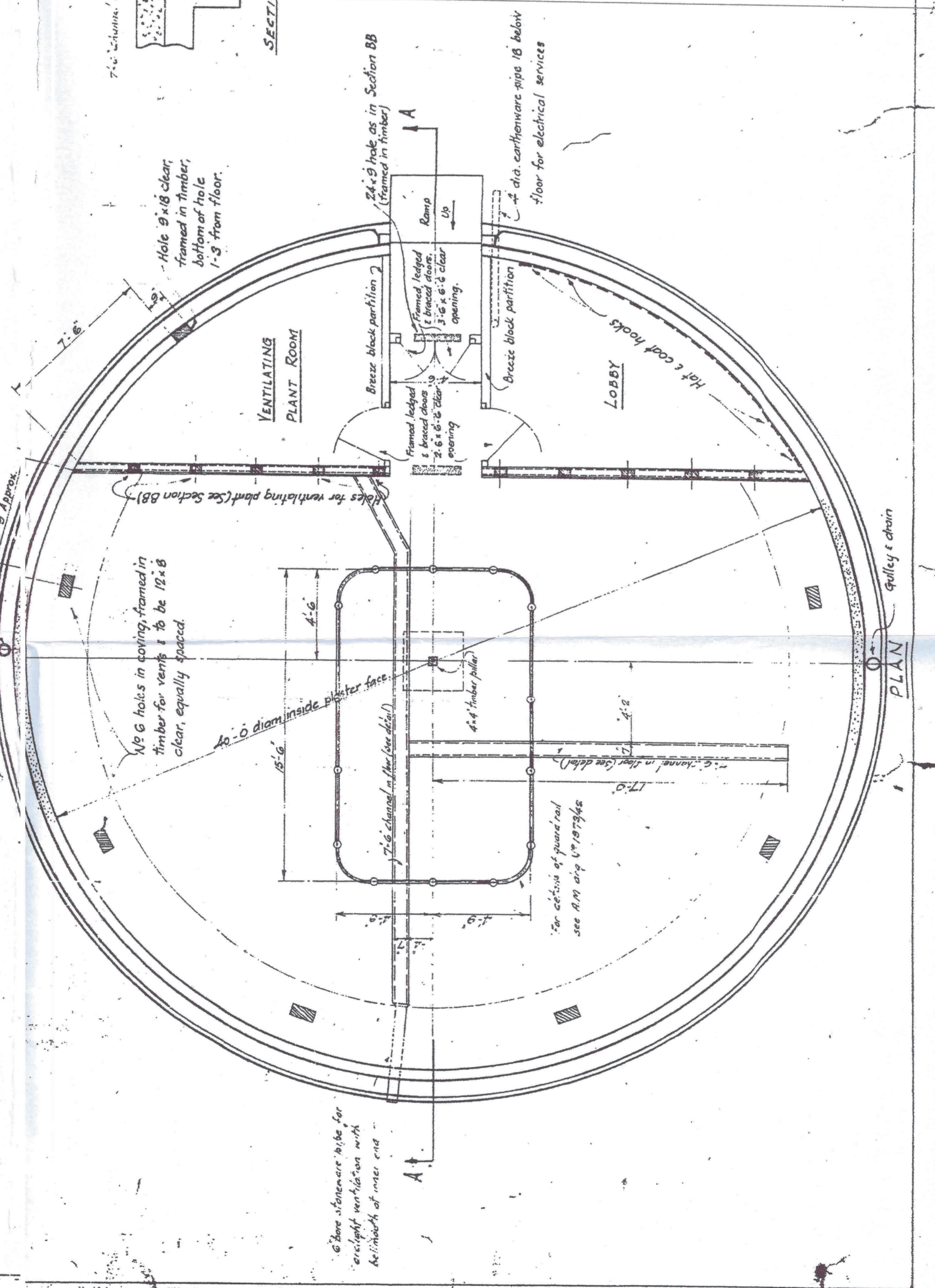
NOTE: Core to be constructed with plaster on Hy-Rib



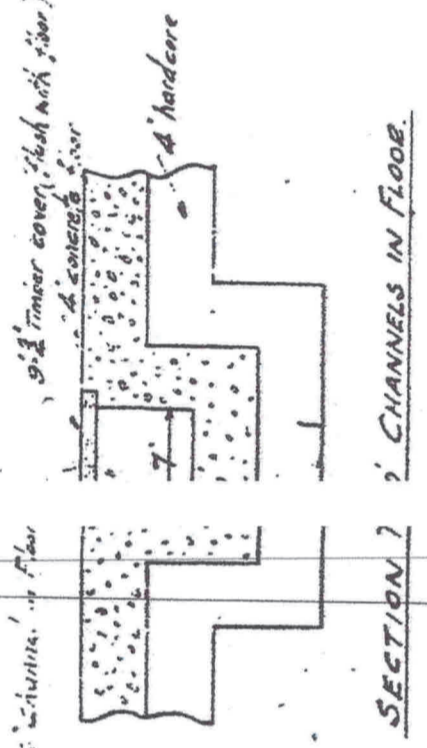
SECTION B-B



ENLARGED SECTION THROUGH WALL OF DOME



PLAN



SECTION C-C CHANNELS IN FLOOR

A.A. DOME INSTRUCTOR  
GENERAL ARRANGEMENT

Scales: 1/4, 1/8, 3/16, 1/2

J.C. W. SUTTON JAN. 1942	FOR IWB	FOR D.G.M.	DIRECTORATE OF WORKS CASE NO.	AIR MINISTRY
			73 42	30x72

REVISED 9/1/42

## APPENDIX B

### PHOTOGRAPHS



IMG\_6009



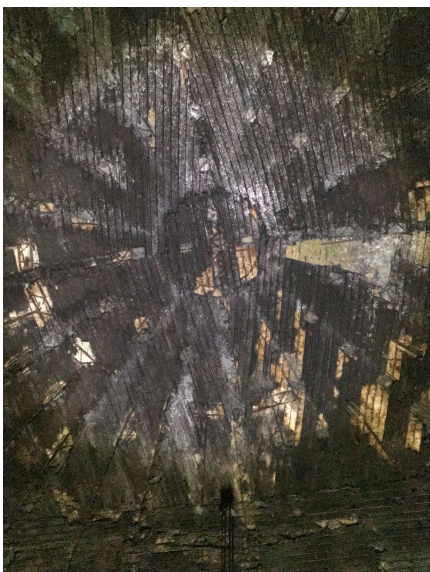
IMG\_6023



IMG\_6029



IMG\_6035



IMG\_6038



IMG\_6058



IMG\_6067



IMG\_6071



IMG\_6074



IMG\_6098



IMG\_6114



IMG\_6121



IMG\_6125



IMG\_6135

### 5.3 Cost Plan



# Binevenagh Coastal Lowlands

## RAF Training Dome

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For

Repair & refurbishment of existing RAF Training Dome

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For and on behalf of:

Hamilton Architects  
3 Joy Street  
Belfast  
BT2 8LE

August 2019

The logo consists of the letters 'RD&C' in a bold, white, sans-serif font, centered within a dark blue rectangular background.The logo consists of the text 'R DAVIS & COMPANY' in a bold, white, sans-serif font, centered within a purple rectangular background.

## Executive Summary

1. The total estimated construction cost for the proposed scheme is in the sum of £328,609 excluding VAT, at 3rd Quarter 2019 price levels.
2. A cost plan summary is found at Appendix C of this report
3. The cost plan includes allowances for the following:
  - Physical construction works
  - Main Contractor Preliminaries
  - Sub-contractor preliminaries & overheads
  - Main Contractor Overheads & Profit
  - Interpretative Signage
  - Design development & construction risk contingencies
4. No allowances have been made in the cost plan for the following:
  - Specific Exclusions detailed in Appendix B of this report
  - Professional Team Fees
  - Other development & project costs
  - Employer change risk
  - Employer other risks
  - Potential effects of inflation
  - Value Added Tax (VAT)
  - Taxation & incentives
5. The Cost Plan is based on a Traditional form of procurement

# Contents

## Executive Summary

- 1.0 Introduction
- 2.0 Description of The Works
- 3.0 Cost Plan
- 4.0 Basis of Cost Plan
  - 4.1 Estimate Base Date
  - 4.2 Pricing Profile & market activity
  - 4.3 Procurement and Contract Strategy
  - 4.4 Information
  - 4.5 Building Works
  - 4.6 Unit Rates
  - 4.7 Main Contractor Preliminaries
  - 4.8 Other Development and Project Costs
  - 4.9 Risk Allowances
  - 4.10 Inflation
  - 4.11 Value Added Tax (VAT)
  - 4.12 Items included in and excluded from Cost Plan

## APPENDICES:

- A Drawings used for Cost Plan
- B Items Included in and Excluded from Cost Plan
- C Detailed Cost Plan

## 1.0 INTRODUCTION

1.1 This report sets out the cost plan at RIBA 2013 Work Stage 2 for repairs and refurbishment to the RAF Training Dome.

1.2 The report has been prepared in response to an instruction from the Architect, Hamilton Architects.

## 2.0 DESCRIPTION OF THE PROJECT

2.1 The Site: The site is located in the village of Artikelly, Limavady.

2.2 Works: The proposed Works comprise: - Provision of repairs to existing superstructure, new internal walls and upper floor, M&E services, sewerage installations, external hard landscaping works and interpretative signage.

## 3.0 COST PLAN

3.1 A detailed cost plan is included in Appendix C of this report.

#### 4.0 BASIS OF COST PLAN

The cost plan has been based on the following:

##### 4.1 Estimate Base Date

4.1.1 The base cost estimate and the risk allowance estimate have been prepared using rates and prices current at the time the estimate is produced – referred to as the estimate base date.

4.1.2 The 'Estimate Base Date' is 1<sup>st</sup> August 2019.

##### 4.2 Pricing profile and market activity

4.2.1 This cost plan/estimate reflects current day prices based on the scope of works referenced therein.

4.2.2 The pricing basis of this cost plan is current market conditions and should be reviewed at regular intervals of no longer than 3 months.

4.2.3 This cost plan has been prepared from outline information only and has a pricing accuracy of +/- 10%. We strongly advise that the consultants should be allowed to develop the brief further before any irrevocable financial commitment is entered into by the Client.

#### 4.3 Procurement and Contract Strategy

4.3.1 The cost plan is based on: (1) A single project procured under a Traditional form of contract; (2) The tender price/contract sum being obtained through competitive tendering; (3) The use of a standard form of contract with non-significant amendments; and (4) Liquidated and ascertained damages being set at levels that are commercially acceptable to contractors.

#### 4.4 Information

4.4.1 The Cost Plan is based upon the information as detailed in Appendix A.

#### 4.5 Building Works

4.5.1 The detailed cost plan describes the building works items included in the cost plan (refer to Appendix C of this report).

#### 4.6 Unit Rates

4.6.1 Unit rates for building works items include overheads and profit, contractor design fees, risk allowances and all other on-costs in connection with works executed by subcontractors and specialist subcontractors.

#### 4.7 Main Contractor's Preliminaries

4.7.1 Main contractor's preliminaries have been calculated on the basis of a percentage addition, which has been determined from an assessment of building projects of a similar nature.

4.7.2 An allowance of 15.00%, of the building works estimate, has been made for main contractor's preliminaries.

#### 4.8 Other Development and Project Costs

4.8.1 No allowance has been made in the cost plan for other development and project costs, e.g. land acquisition costs, finance costs, fees and charges in connection with the development, planning contributions, insurances, decanting and relocation costs, tenant's costs and contributions and other employer costs in connection with the building project.

4.8.2 It is recommended that the Client make sufficient budgetary allowances for other development and project costs in any investment and/or development appraisal for the scheme.

## 4.9 Risk Allowances

4.9.1 Risk allowances have been determined and included in the cost plan as follows: (1) Construction risks: +10% (2) Employer change risks: No allowance (excluded); and (3) Employer other risks: No allowance (excluded).

4.9.2 Notwithstanding the risk allowances included in the cost plan, no costs have yet been ascertained for any specific risk. They are simply initial risk allowances, which will be reassessed in conjunction with the employer and project team members as the design develops and as action is taken to reduce the risk exposure.

4.9.3 It is recommended that the Client make sufficient budgetary allowances for employer's change risks and employer's other risks in any development or investment appraisal for the project.

4.9.4 The allowance made for M&E services is indicative and not based on any detailed design information.

## 4.10 Inflation

4.10.1 No allowances have been included in the cost plan for tender inflation (i.e. inflation from the estimate base date to the date of tender return)

4.10.2 It is recommended that the Client make sufficient budgetary allowances for tender inflation in any development or investment appraisal for the project.

## 4.11 Value Added Tax (VAT)

4.11.1 No allowance has been included in the cost plan for VAT.

4.11.2 VAT in relation to buildings is a complex area. Therefore, it is recommended that specialist advice be sought to ensure that the correct rates are applied to the various aspects of the scheme.

## 4.12 Items included in and excluded from Cost Plan

4.12.1 A summary of the items included in and excluded from the cost plan is given at Appendix B to this report.

## APPENDIX A

### INFORMATION USED FOR COST PLAN

#### Hamilton Architect's Drawings

RAF Training Dome - Existing Site Layout	A1	(00) 301	x
RAF Training Dome - Site Plan	A1	(00) 302	x
RAF Training Dome - Existing Plan	A1	(00) 303	x
RAF Training Dome - Proposed Plan	A1	(01) 303	x
RAF Training Dome - Elevations	A1	(00) 304	x
RAF Training Dome - Sections	A1	(00) 305	x



## APPENDIX B

### ITEMS INCLUDED IN AND EXCLUDED FROM COST PLAN

Ref	Item	Included	Excluded	Comments
1	VAT		X	
2	Professional Team Fees		X	
3	Legal & Tax specialist		X	
4	Finance Costs		X	
5	Insurances		X	
6	Asbestos Removal		X	

## APPENDIX C

### COST PLAN

**Binevenagh & Coastal  
Lowlands Sites**



No.	Description	Amount £ (R)
	<b>Binevenagh &amp; Coastal Lowlands Sites</b>	
1	RAF Training Dome	328,609
	<b>Total</b>	<b><u>328,609</u></b>

No.	Description	Amount £ (R)
<b>RAF Training Dome</b>		
1	Conservation Works	85,136
2	New Work	51,465
3	External Works	112,169
4	Interpretation	11,000
5	Preliminaries	38,966
6	Construction & Design Contingencies	29,874
<b>Total</b>		<b><u>328,610</u></b>

No.	Description	Amount £ (R)
<b>Conservation Works</b>		
1	Alterations	
2	Allow for remove existing vegetation around existing External Door entrance, making good	250
3	Allow for concrete repairs to concrete plinth 330 deep(allow Approx Quantity)	2,720
4	Allow for providing new set of Steel Double Doors & frames complete with ironmongery etc	1,250
5	Allow for existing plant debris to be removed by Volunteer group for re configuration (approx 5M2)	300
6	Allow for removal of extensive vegetation growth from plinth 550 girth	750
7	Allow for removal of animal waste from the floors, clean & inspect	900
8	Allow for repairs to existing screeds, taking up and replacing approx 20M2)	1,000
9	Allow for carefully removing existing steel framed wall	750
10	Allow for temporary propping of existing door surround	150
11	Allow for power wash down of internal surface of dome	2,156
12	Allow for inner surface of dome to be treated with 50mm gunite coating of Renderoc DS; includes 50x50 x12g wire mesh	53,900
13	Allow for extending External door frame surround to form concrete surround to Door	525
14	Allow for taking samples of waterproof coating for laboratory analysis (allow PS of 500)	500
15	Allow for removing loose sections of external concrete dome, cleaning down & recasting concrete (allow approx quantity 10%)	8,400
16	Allow for cleaning down existing dome & applying new bituminous waterproof layer to match existing spec	11,585
<b>Total</b>		<b><u>85,136</u></b>
<b>New Work</b>		
1	Allow for new stud partitions to form MP room, Acc WC, Lobby, store & control Rooms FF	6,750
2	Extra over for junctions etc	930
3	Allow for FF construction	2,400
4	Allow for forming opening for access, trimming around incl guard rail	500
5	Allow for new Door set including ironmongery, decoration etc	1,950
6	Ditto set of double doors	1,500
7	Access ladder to FF	250
<b>Carry Forward</b>		<b>14,280</b>

No.	Description	Amount £ (R)
	<b>Brought Forward</b>	<b>14,280</b>
8	New cast metal vent grill to duct	250
9	Mechanical	
10	Allow for new plumbing to Acc WC	950
11	Allow for Doc M pack to Toilet	750
12	Allow for heating system	1,430
13	Allow for Air conditioning	10,725
14	Electrical incoming supply	10,000
15	Electrical consumer unit and distribution	1,430
16	Power	2,860
17	Lighting, including suspended lighting system	3,575
18	Telecoms	715
19	Allow for AV equipment etc (Projector & Screens)	2,500
20	Allow for sundry fixtures & fittings etc	2,000
	<b>Total</b>	<b>51,465</b>
	<b>External Works</b>	
1	Allow for new medium duty access road with gravel finish as indicated	20,535
2	Allow for excavating trench, laying ducting and electric cabling, backfilling & making good surfacing	3,800
3	Ditto for water connection	3,500
4	Ditto for tele communications	2,500
5	Allow for connection to existing Electric Service, water service & Tele communications	5,000
6	Clear back existing path of undergrowth & clean down	1,150
7	Allow for concrete repairs to existing path ( allow approx quantity)	2,000
8	Allow for facing back existing hedge to path line	900
9	Clear existing undergrowth & excavate etc for new bitmac road	12,455
10	Clear existing undergrowth etc, excavate, new soiling 300 deep & wildflower seeding	2,940
11	Clear existing etc & lay new concrete path	1,232
12	Aco drain 1600 long to path including drainage connection	500
13	Forming embankment to dome, clearing , soiling, grading & seeding	18,750
14	Clear undergrowth etc & lay 150 wide pea gravel strip	323
	<b>Carry Forward</b>	<b>75,585</b>

No.	Description	Amount £ (R)
	<b>Brought Forward</b>	<b>75,585</b>
15	Allow for infilling hedge as indicated	300
16	Allow for security type fencing adjacent to dome as indicated	1,125
17	EO for Access Gate 3M wide	1,250
18	Allow for Pillars, all making good	1,800
19	Work to Front Entrance	
20	Remove existing fencing etc	250
21	Allow for new asphalt path for pedestrian access as indicated	3,030
22	Allow for new bitmac road for vehicular access as indicated	6,380
23	Allow for new 2M high secure fencing, making good surfacing	3,150
24	Allow for pedestrian gates	750
25	Allow for set of double vehicular gates	1,750
26	Allow for pillars	1,800
27	Drainage	
28	Allow for Drainage to new toilets & storm outlets	5,000
29	Allow for septic tank & filtration trenching	10,000
	<b>Total</b>	<b><u>112,170</u></b>

No.	Description	Amount £ (R)
<b>Allow for new medium duty access road with gravel finish as indicated</b>		
1	Excavate to RL, compacting, road basecours build up, gravel finish compacted	17,280
2	Allow for edging & making good to perimeter of road	3,255
<b>Total</b>		<b>20,535</b>
<b>Clear existing undergrowth &amp; excavate etc for new bitmac road</b>		
1	Excavate to RL, compacting, road basecours build up, bitmac finish compacted	9,900
2	Allow for edging & making good to perimeter of road	2,205
3	Joint to existing concrete	350
<b>Total</b>		<b>12,455</b>
<b>Clear existing etc &amp; lay new concrete path</b>		
1	Excavate to RL, compacting, path basecours build up, concrete finish exposed aggregate	932
2	Allow for edging & making good to perimeter of road	300
<b>Total</b>		<b>1,232</b>
<b>Allow for new asphalt path for pedestrian access as indicated</b>		
1	Excavate to RL, compacting, path basecours build up, bitmac finish compacted	2,205
2	Allow for edging & making good to perimeter of road	825
<b>Total</b>		<b>3,030</b>
<b>Allow for new bitmac road for vehicular access as indicated</b>		
1	Excavate to RL, compacting, road basecours build up, bitmac finish compacted	5,060
2	Allow for edging & making good to perimeter of road	1,320
<b>Total</b>		<b>6,380</b>



No.	Description	Amount £ (R)
<b>Interpretation</b>		
1	Allow for New Interpretation panels as indicated size 1500 x 2500 fixed to wall	4,500
2	Allow for new external Interpretation panels on steel plinth	6,500
<b>Total</b>		<b><u>11,000</u></b>