



RiverOak Strategic Partners

Update on Relocation of HRDF

TR020002/D11/RHRDF

Examination Document

A faint, dark purple background image of an aircraft's wing and landing gear, positioned diagonally across the lower half of the page.

Project Name: Manston Airport Development Consent Order
Application Ref: TR020002
Submission Deadline: 11
Date: 5 July 2019

MANSTON AIRPOT DEVELOPMENT CONSENT ORDER APPLICATION

Update on relocation of the HRDF and response to the MOD's Deadline 9 Submission

1 Introduction

1.1 The Applicant has been actively seeking a satisfactory solution to the HRDF issue with the MOD since January 2017. This reflects our appreciation and recognition that this is a critical piece of technical equipment for the MOD. We are clearly disappointed that, some 2 years later, this issue has yet to be fully resolved. We feel that this should have been possible, if all parties had been actively seeking a positive outcome. The late involvement this year of the MOD's Project MARSHALL Delivery Team and Aquila, their Engineering Authority for HRDF (whom we had been seeking to contact throughout early 2018), brought from a technical perspective a welcome degree of pace and positive energy to the issue. Nevertheless, we feel that DIO's position has changed little.

1.2 The MOD's most recent submission (28 June 2019) illustrates this issue in that it appears somewhat inconsistent and contradictory. The technical statements appear positive, constructive and potentially the basis for the SoCG which the Applicant has sought since March 2018. However, from the land use perspective DIO (which is not an MOD Technical or Engineering Authority) seem unwilling to actively support the identification of potential solutions, appear to contradict or question the findings of the relevant MOD subject matter experts and have failed to keep abreast of developments in the search for a mutually acceptable solution. There appears to be little direct contact between the DIO and the Project MARSHALL Delivery Team; both MOD entities. As a result, we have consistently felt that DIO's position has, and based on their latest submission still does, lag a more favourable potential outcome to this issue which is beginning to materialise. The challenge for the Applicant is that, under the DCO process, the DIO represents the MOD perspective.

1.3 Indeed, as we will go on to illustrate, the series of comments throughout the MOD's submission regarding the Non-disclosure Agreement and the contract between the Applicant and Aquila, the contract amendment process and the contract price, none of which have any relevance to the identification of a potential solution to the HRDF issue, gives further cause for concern about some MOD party's willingness and appetite to reach a mutually acceptable solution.

1.4 Ultimately, we remain genuinely disappointed that, despite the best efforts of many involved, this issue has not been resolved before the Deadline 11. Nonetheless, we feel that there is sufficient evidence both within the MOD submission but particularly within the Aquila Technical Report, to be confident that a technical solution is within reach and, with suitable planning conditions which the Applicant would fully accept, the airport redevelopment project can move forward.

2 The Role of Aquila

2.1 Before progressing further, we feel it would be appropriate to emphasise the role of Aquila as we believe the most recent MOD submission does not reflect its importance in this issue.

2.2 Aquila was established by a consortium of companies (including, but not limited to, Thales and NATS) and were awarded a £1.5 billion MOD project to transform the military Air Traffic

Management (ATM) capability at all MOD operated sites in the UK and overseas; to invest in equipment and infrastructure; and to merge around 80 contracts into one service contract. As such, they are the MOD Engineering Authority for many of the military ATM systems including HRDF. Aquila are responsible and contractually committed to the MOD to ensure that a specific level of ATM equipment and service (which includes HRDF capability and coverage) is at all times maintained. Their technical opinion should therefore be seen as definitive and authoritative and credit should be given that their assessment is based on a suitable technical capability and solution also being available.

- 2.3 The fixation of the latest MOD submission on the NDA, Contract, Contract Amendment Process and the contract price between the Applicant and the MOD's own Engineering Authority is unhelpful. It should not be allowed to infer that the Applicant had (or sought) any degree of influence or direction over the Aquila's independent technical assessment. This is important as, during the course of their assessment and in the spirit of seeking a positive outcome to this issue, Aquila identified and considered a number of alternative locations which they felt may give more favourable coverage to continue to meet their contracted obligations to the MOD.
- 2.4 It is stated in the MOD's most recent submission that the Applicant changed the potential sites under consideration without informing DIO. However, we would wish to emphasise that it was Aquila, as the MOD's own Engineering Authority, who was suggesting and exploring such options; the Applicant had no influence or control over this. The image in Figure 1 below shows the numerous sites which Aquila elected to survey or model.



Figure 1 - in seeking a positive outcome, Aquila surveyed and modelled a wide range of potential locations

- 2.5 We feel that such a constructive approach by Aquila has ensured that, as Examination comes to a close, we can confidently state that three viable alternative locations have been identified which give better coverage than the current location of the HRDF.

3 Findings of the Aquila Technical Assessment

- 3.1 Aquila have provided permission for the Applicant to submit an un-redacted copy of their report to the Examining Authority (ExA) for consideration (this is provided at Appendix 1 to this document). Indeed the email response of their Senior Commercial Manager to the offer of redaction clearly demonstrates a high level of confidence in their findings:

I'm of the view that by having the respective names on the of the document it adds credibility to it and strength to the findings'

- 3.2 As can be seen from the report, the Technical Assessment was comprehensive and considered a number of potential sites, only some of which have been included in the report, both against terrain data, obstruction data (gained from Light imaging, Detection, and Ranging (LIDAR) scanning) and computer modelling data of the proposed airport development. There is therefore a very high degree of confidence in their findings not only in terms of the current situation but equally after airport development has been complete in the vicinity of the HRDF option sites.
- 3.3 We believe this report, which we must emphasise was independently prepared by the MOD's own Engineering Authority after extensive modelling and on-site surveying, provides a high level of confidence that there are three viable sites for relocation of the HRDF.
- 3.4 We commend Aquila's comprehensive and conclusive report to the ExA but would wish to highlight one specific aspect. Figure 2 below shows the coverage of the current HRDF installation as a green solid line, between 75 and 100 nautical miles radius from Manston. The light blue hatched line represents the coverage that Aquila's preferred location provides after the airport has been developed. Such an increase in coverage is reflected in all three of the sites identified by Aquila. Therefore, the Applicant is not only able to offer a location for the HRDF which provides equivalent performance to that currently enjoyed but is actually able to offer a capability which, even after airport redevelopment, provides a greater degree of coverage than the current site.

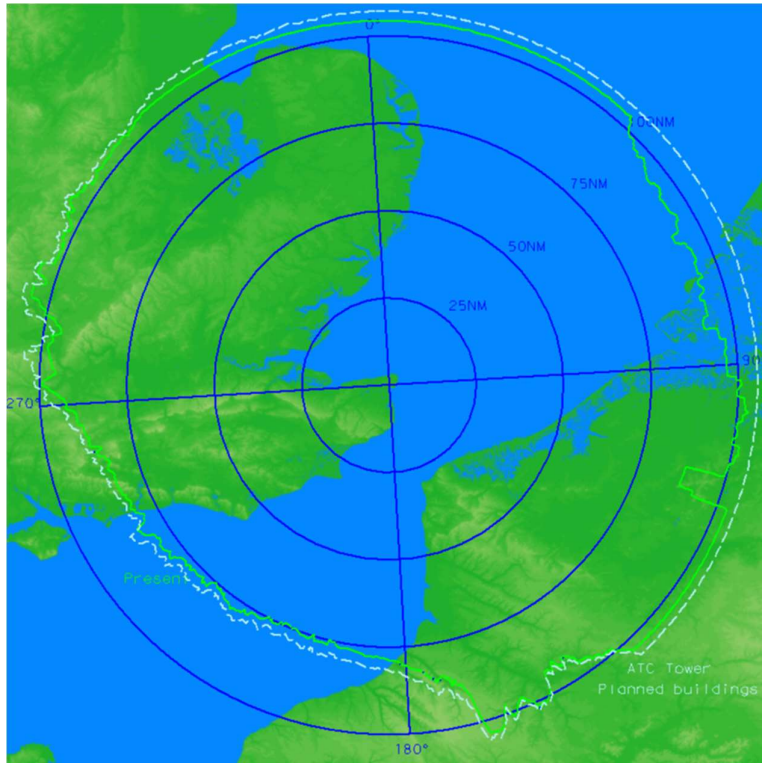


Figure 2 - Each of the 3 proposed locations offer the MOD enhanced coverage even after airport development

3.5 Once again, we must reiterate, as the MOD's Engineering Authority with commercial liability for delivery of this capability, Aquila's finding should not just be seen as theoretical modelling. It also takes into account their detailed understanding of the system and technical solution that they will be responsible to the MOD for developing, installing, commissioning and maintaining.

3.6 We believe that Aquila's Technical Assessment report should give the ExA a high degree of confidence that there are a number of potential solutions to the issue of relocating the HRDF even if one entity within the MOD is not yet in a position to commit to a site single solution.

4 Response to the MOD statement

4.1 Turning specifically to the MOD submission dated 28 June 2019, we believe it illustrates the inconsistency in the MOD's position and approach thus far; nevertheless, we are confident that there is sufficient within it on which a successful outcome can be built. We are therefore happy to support the proposition that robust conditions associated with the HRDF are attached to any planning approval.

MOD agreements in principle

4.2 In para 2(i) the MOD submission states that it:

'has indicated to the Applicant that, in principle, it is possible that the HRDF could be re-provided assuming: that the replacement facility would comply with MOD siting requirements; that the new technical facility would have to be tested to verify that its performance capabilities [sic] to the standards required by the MOD; that the siting of a new

technical facility would be compatible with MOD safeguarding requirements and relevant safeguarding zones to protect the operation of the new facility are put in place.’

We very much welcome and fully accept this statement but would wish to emphasise that this position has not previously been conveyed by the MOD to the Applicant.

4.3 We also welcome the statement that:

‘..a relevant covenant put in place in any site acquisition documents whereby no building or structure could be erected above ground level within 120 metres of the HRDF (or equivalent zone required by safeguarding criteria relevant to any new type of equipment installed at a new site to undertake the function of the current HRDF)’

Although it does not recognise that the three potential sites identified by Aquila are significantly elevated and therefore the requirement to maintain a 120 metre sterile area would not apply, it is pleasing to note that, for the first time, the MOD accepts that that safeguarding criteria to be applied will be relevant to the type of solution being considered rather than purely that described in JSP 604.

Potential Sites Considered

4.4 Throughout its submission the MOD suggests that the Applicant was inconsistent in conveying which sites it was proposing. This is incorrect as, as highlighted above, additional sites were introduced and either developed or discounted as a result of modelling by Aquila, the MOD’s own Engineering Authority. We believe this reflects the flexible, positive and comprehensive nature of Aquila’s assessment and should not be conveyed as inconsistency on behalf of the Applicant.

4.5 At numerous points in its submission the MOD refer to Site 1 which was proposed as a starting point for the Aquila analysis. However, during Aquila’s study it was quickly identified that alternative locations and technical solutions, which were not initially available for the Applicant to consider, provided superior coverage. Therefore, in the interests of meeting the timescales of the Examination Phase and to ensure that activities such as LIDAR scanning were focused on the correct area, Site 1 was superseded in the analysis. We therefore see little benefit in countering the various points made regarding Site 1 as the MOD’s own Engineering Authority proposed superior alternative locations and technical solutions.

The DIO approach

4.6 We are uncomfortable with the negative connotations associated with comments about the NDA, contract, contract amendment process, scope of work and contract price between the Applicant and Aquila which we feel are beyond the remit of DIO to comment upon, particularly when representing the overall MOD position; Aquila is the MOD’s own Engineering Authority on this issue.

4.7 Equally comments such as those in para 2(vii)(b) that:

‘..there is no compelling reason for it to consider relocating the HRDF to Crown Land elsewhere. From the perspective of the MOD landowner, the proposal to relocate the HRDF

to Crown Land would not be acceptable (regardless of whether or not the site is technically suitable).’

reflects the way discussions with DIO have been conducted. While some elements of MOD have approached this challenge in a positive and constructive manner, we find such statements unhelpful. The issue of relocating on Crown Land has never been offered or discussed; it was first raised as a possibility by Aquila. We therefore find it difficult to comprehend why such a strident position, emboldened by DIO for emphasis, would be taken if a technical solution were offered which would enhance the MOD’s HRDF capability. We believe that such statements, in the face of a potentially better solution for MOD, illustrate why resolution on this issue has not been possible over the past 2 years.

- 4.8 Ultimately, Aquila have submitted a comprehensive, compelling and ultimately independent assessment of the options for relocation of the HRDF, none of which are on Crown Land (although the communications mast operated by Arqiva sits on Crown Land). We would commend the MOD to embrace it and the Ex A to accept.

Inconsistencies in the MOD submission

- 4.9 We note significant inconsistencies in the MOD’s submission which, we can only assume, reflects the different perspectives of the various entities that have contributed to it.
- 4.10 As highlighted above, para 2(i) helpfully recognises that equivalent safeguarding criteria will be required for any new type of equipment installed; we agree with this statement. However para vii (c) states that only JSP 604 criteria can apply without exception and this should have been included as part of the contractual arrangements between the Applicant and Aquila. We believe this statement significantly exceeds DIO’s technical competence, it does not respect and reflect the role of Aquila as the MOD’s Engineering Authority who themselves identified the technical scope of the study, and it can only be seen as an attempt to constrain and frustrate the Aquila Technical Assessment, applying safeguarding criteria which are not necessarily relevant to the technical solution proposed.

- 4.11 At para viii of the MOD submission states that:

‘Even if a new site were to be identified with the correct technical capability, if it remains close to the proposed airport development . . it would have to be assessed in the light of this’

Put simply – it has been. As can be seen from the Aquila Technical Assessment report (such as Sections 4.43 ad 4.54), all of the Aquila assessments already take into account the planned development which was based on 3D Computer Assisted Design (CAD) modelling.

- 4.12 Additionally, at para 2(ix) the MOD submission states that:

‘.the MOD would have to take into account other site related matters such as access, security, the connections with any utilities or telecommunications and the provision of any associated wayleaves’

However, in Section 6 the Aquila report clearly states that it has considered these issues, identifying the advantages of the preferred site as being:

Location is in the Proposed Development Area

Comms and Power available from tower

Easy to Maintain

Good coverage

Continuity of the Service

Equipment will be in ATC (secure)

No separate planning application

No GEO survey required

- 4.13 We not only feel that these are examples of inconsistency in the MOD's position but equally suggest a desire to undermine or discredit the findings and analysis by the MOD's own Engineering Authority for this capability. Such points have been fully considered in the Aquila Technical Assessment.

Inability to reach a SoCG

- 4.14 The MOD DIO submission explains why it has not been possible to reach a common position on this issue before the end of the Examination phase. The Applicant is very disappointed that this has not been achieved. Throughout the Aquila Technical Assessment we have kept the MOD's Project MARSHALL Delivery Team regularly informed of the positive progress that was being made by Aquila. From 30 May 19 we have frequently asked that MOD be prepared to consider the Aquila report once it was complete (by 28 June 19). The Applicant also made themselves available at any time once the report had been delivered to discuss the issue with MOD; such offers were not taken up and there has been no engagement by MOD since completion of the Aquila report.
- 4.15 A first draft of the report was sent by Aquila to the Project MARSHALL Delivery Team on 27 June 19. The final report was sent by the Applicant to both the Project MARSHALL Delivery Team and DIO on the same day it was submitted by Aquila. Although we recognise that timings were a challenge, and we made it clear to the MOD that full resolution was not expected in the short timescale, it is nevertheless disappointing that offers made to meet and discuss agreeing a SoCG as a result of the Aquila Technical Assessment were not taken up by MOD.

Acceptance of Planning Conditions

- 4.16 We do not propose commenting further on the MOD's specific responses to Round 4 of the Written Questions; save that, as can be seen from this response, we clearly do not agree with some of the statements made. However, in the interests of ensuring a positive outcome to this issue, and to demonstrate to the ExA our complete commitment to ensure this issue is ultimately addressed to the satisfaction of the MOD, we would wish to highlight that the Applicant fully accepts that, in accordance with the MOD's response to DCO 4.25,

conditions should be placed on any planning approval to protect the interests of the MOD and ensure that the HRDF capability is protected.

- 4.17 We believe that engagement with the Project MARSHALL Delivery Team, with Aquila and the findings of Aquila's independent technical assessment mean that we are completely confident that a solution can not only be found but that 3 potential locations have been identified that are not only viable, but which actually enhances the MODs HRDF capability.

APPENDIX 1: PHASE 1 A - MANSTON HRDF RELOCATION - FEASIBILITY STUDY REPORT

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PHASE 1 A - MANSTON HRDF RELOCATION - FEASIBILITY STUDY REPORT

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REFERENCE DOCUMENTS

Manston HRDF Infringement Report

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1. INTRODUCTION

- 1.1 Changes are required to the Manston Airfield to accommodate and support the move of the HRDF to a new location as a result of proposed development on the Airfield.
- 1.2 Currently, the HRDF is located at the centre of Manston Airfield as depicted in Figure 1 of this document.
- 1.3 The Developer has requested a feasibility study to investigate moving the existing HRDF, this is Phase 1A of the Scope of Work.
- 1.4 This report sets out the work completed during the Feasibility Study to determine suitable potential locations for the existing HRDF which continue to provide the required coverage.
- 1.5 The screen shot below depicts the locations surveyed or modelled (remaining as possibilities or discounted) during this Feasibility Study.



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2. SCOPE OF WORK COMPLETED FOR PHASE 1 A

2.1 The Contractor has liaised with Osprey, the Developer, NATS and DT during this Scope of Work in order to fully understand and determine:

The Developers plans regarding future development of the Airfield.

The specified services are provided in accordance with the Authority's Requirements.

The Contractor proposed a schedule for this work, an extract of which is provided in this document.

The predicted coverage that the new location of the HRDF may provide and compare this with that currently contracted.

Available and suitable locations from a Site Survey and LIDAR Infringement Assessment to confirm site requirements for power, comms, building facilities and obstruction analysis.

Computation of Area of Interest (AOI) coverage modelling based on possible new location including the modelling of the future building development proposed.

This report summarises the above work conducted and provides recommendations on proposed HRDF locations with any limitations or caveats.

Manston Airfield Outline of the project

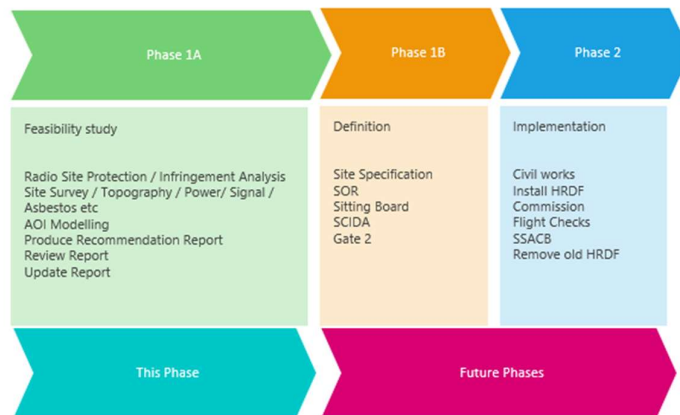
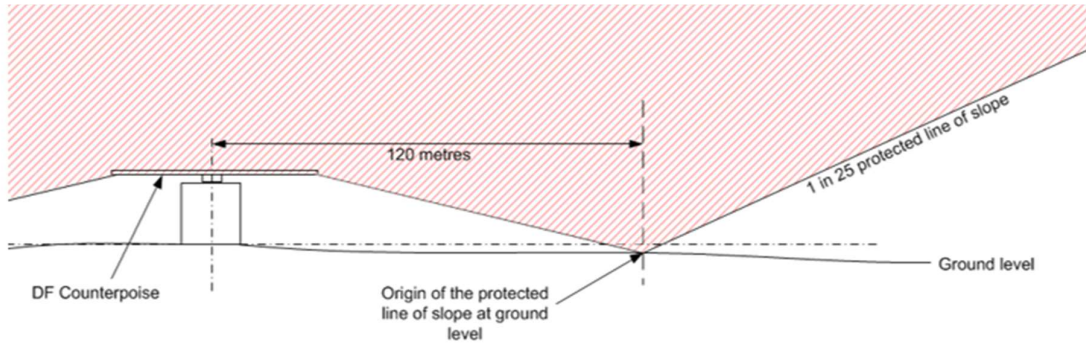


Figure 1 – Manston Project Phases

3. SURVEY CRITERIA

3.1 Safeguarding criteria applied in Infringement Assessment Report as defined by JSP 604.



- No buildings, structures or objects of any description other than those forming part of the equipment itself or required for maintenance of the equipment is permitted within a circle of radius 120m (400ft) if their height would penetrate a surface commencing at the edge of the DF counterpoise and sloping downwards to the nearest point at ground level on the circumference of the circle.
- No buildings, structures or objects are allowed to penetrate a surface created by a line of slope 1 in 25 commencing at ground level at the 120m radius, and extending outwards from the circumference of the circle.

Figure 2 - Safeguarding criteria

3.2 Manston Airfield Development Proposal



Figure 3 – Development proposals

4. Surveyed sites for relocation of HRDF

- 4.1 During this Feasibility Study, Aquila has analysed multiple HRDF locations and has produced a selection of possible HRDF sites that are considered suitable for relocation of the current HRDF system.
- 4.2 Preliminary analyses are performed using line of sight optical visibility as an approximation to operational limits of HRDF coverage. During Flight Checking, a HRDF is checked to 90 Nautical Miles at an altitude of 5000ft. Hence, in this report, all the results are provided using an analysis domain slightly larger than 100NM and an altitude of 5000ft.
- 4.3 HRDF Current location



Figure 4 - HRDF Current Location

- 4.4 HRDF current coverage – Terrain Only
- 4.5 In order to perform a direct comparison of potential sites and their coverage the current coverage must be known. Figure 5 provides the current AOI as derived from modelling including terrain to determine the known starting point.
- 4.6 Throughout this Report comparisons of potential sites are performed; the current location coverage is always depicted in green.

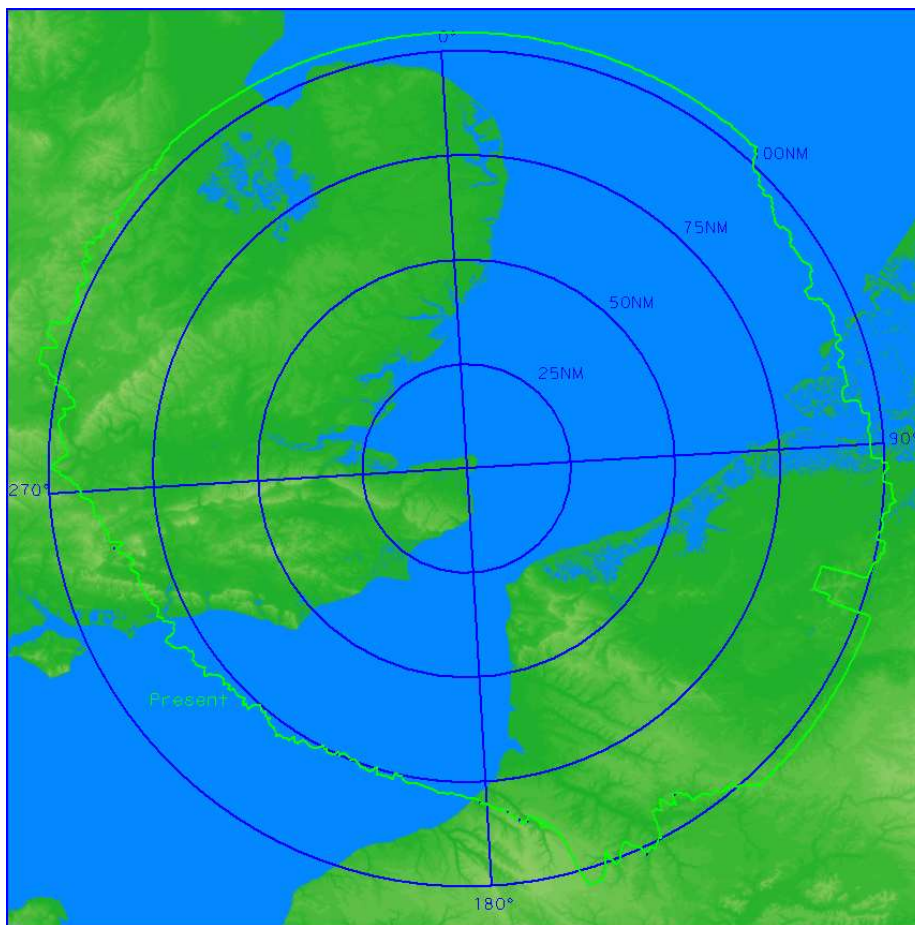


Figure 5 - HRDF current coverage

- 4.7 HRDF Current Network coverage – Terrain Only
- 4.8 Furthermore, it is important to consider the HRDF Network Coverage since adjacent units may infill the Manston Coverage. Figure 6 shows the optical visibility for the present HRDF together with the optical visibility of the neighbouring HRDF sites at Wattisham and Thorney Island.
- 4.9 The figure is useful in assessing the predicted coverage overlap between these sites and hence regions of coverage that are covered by the HRDF Network.
- 4.10 It is clear from this figure that a region ranging from the East and to the South of the Manston HRDF is only covered by the Manston HRDF.
- 4.11 Note also that for Auto Triangulation to perform correctly, the coverage area will need at least two HRDFs in coverage for a particular target.

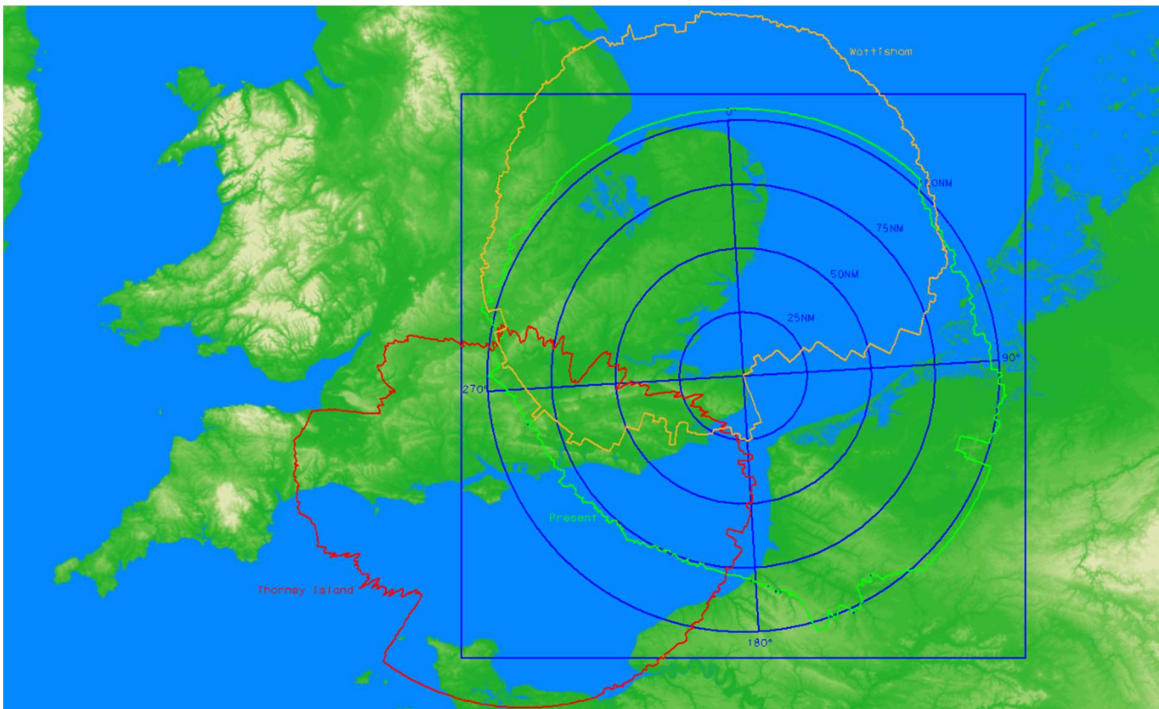


Figure 6 - HRDF current network coverage

4.12 Osprey proposed location for HRDF – Site 1

4.13 This location is the site proposed by Osprey and the Developer prior to this Feasibility Study. The Location is outside the Airport boundary in a local farmers field and is offset from Runway 28 Approach Lights.



Figure 7 - HRDF Site 1 Location

4.14 Prior to Site Survey, this location was identified to be in a dip; the effect of which obscures coverage as shown in Figure 8.

4.15 Additionally, this site would require significant power and comms facilities to be laid in and it subsequently became apparent that an adjacent field is due to have development with proposed 3 story high buildings.

4.16 HRDF Site 1 Coverage – Terrain Only

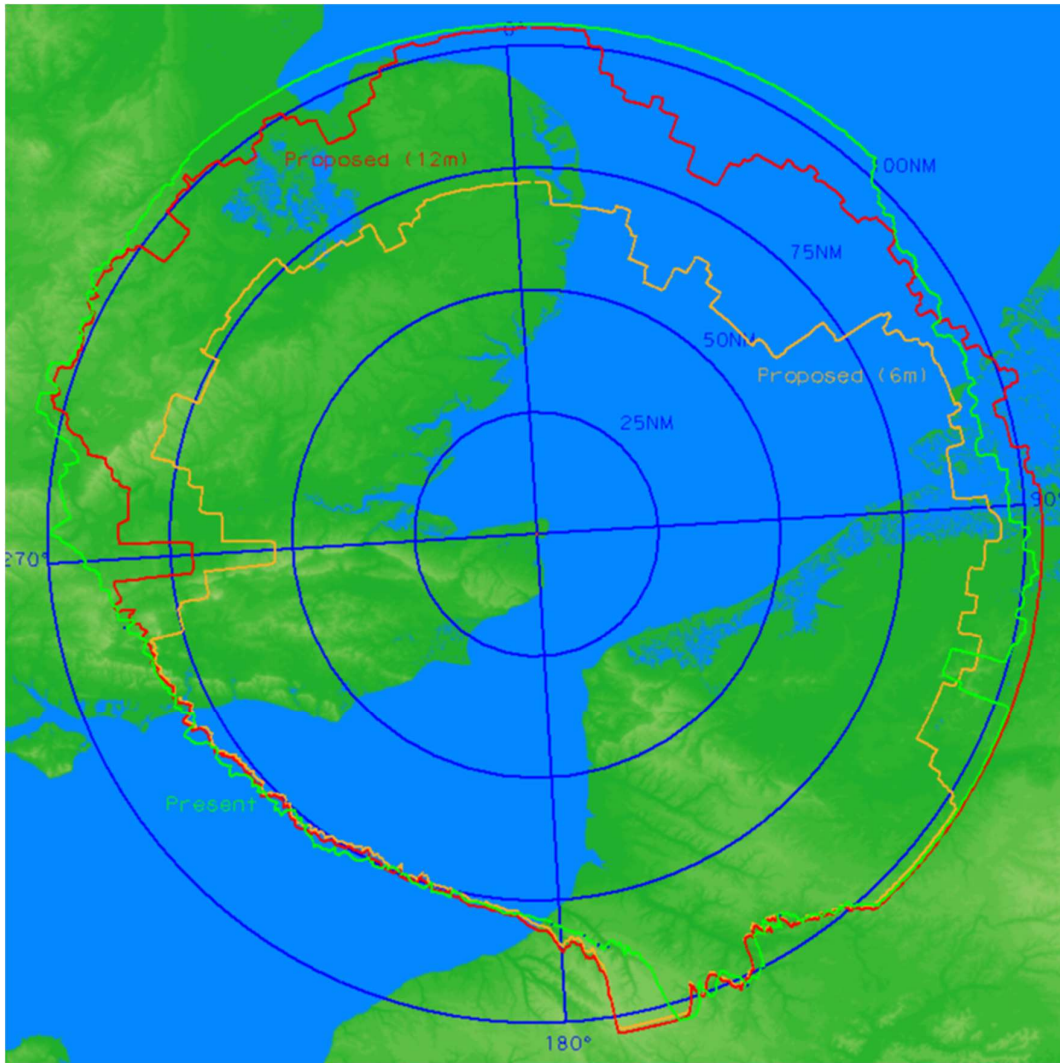


Figure 8 - HRDF Site 1 coverage

4.17 Clearly in addition to the disadvantages previously outlined, the coverage provided at this location falls far short of that currently achieved, even when elevating the Antenna to 12 meters to overcome ground slope. This site was therefore discounted without further analysis.

4.18 HRDF – Site 1 Alt location (Site 1A)



Figure 9 - HRDF Site 1 Alt Location

- 4.19 A location in the same field but at higher ground was studied, this has the same disadvantages as Site 1 but is an elevated location in comparison.
- 4.20 The modelled coverage for this site is shown in Figure 10 and, whilst better than Site 1, it still falls short of the current coverage and would also be adjacent to proposed development. This location was also therefore discounted without further analysis

4.21 HRDF Site 1 Alt Coverage – Terrain Only

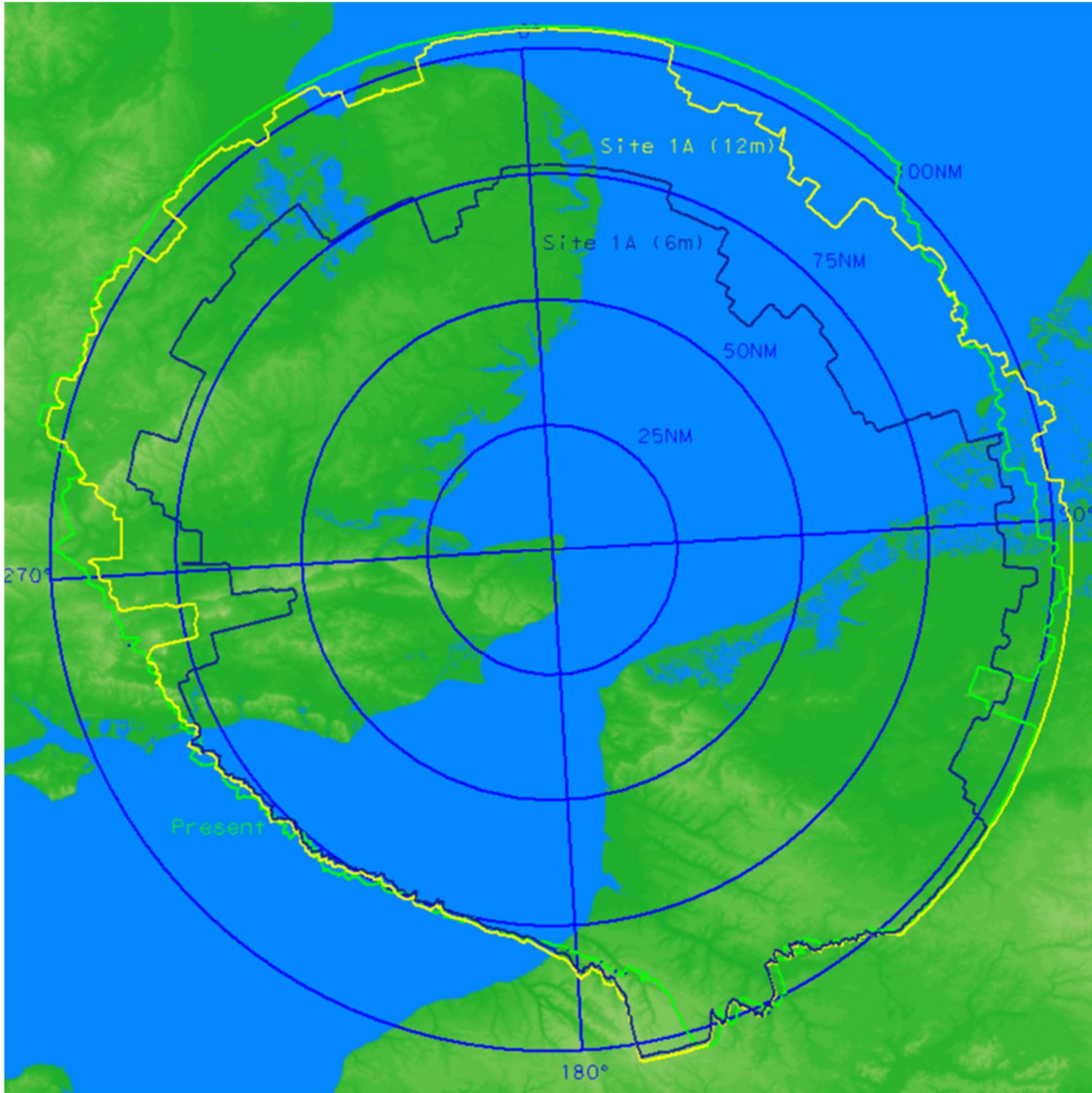


Figure 10 - HRDF Site 1 Alt coverage

4.22 HRDF – Radar Tower location



Figure 11 - HRDF Radar Tower location

- 4.23 This location was Site Surveyed and has power, comms, portacabin, standby generator and a significant tower in place.
- 4.24 Additionally, it is inside a compound which provides a level of security.
- 4.25 It provides good coverage (and exceeds the current coverage) but should the development of Manston go ahead the plan is to re-use this location for a replacement Radar Station.
- 4.26 Since the infrastructure is therefore effectively not available, this Site has been discounted. However, it remains a viable site should the development not go ahead, or an alternative site be used for the Radar.

4.27 HRDF - Fire Station Microwave tower location



Figure 12 - HRDF Fire Station Microwave tower location

- 4.28 Currently located on MoD land, this location has an existing Microwave Tower which is used by Arqiva.
- 4.29 Contact with the current users reveals that they are open to a Site Share arrangement on the mast (subject to design, contracting arrangement etc.) and Aquila currently have arrangements with Arqiva on other towers.
- 4.30 This location was Site Surveyed and has power, comms and a significant tower in place.
- 4.31 Additionally, it is inside a compound which provides a good level of security.
- 4.32 The coverage from this location is extremely good and exceeds that of the current location. This is therefore a viable Site.
- 4.33 Apart from arrangements required with Arqiva, the height of this mast would also necessitate new arrangements for climbing and maintenance of the equipment, but this would be looked at in the definition stage.
- 4.34 The predicted coverage for this Microwave Tower is shown in Figure 13.

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4.35 HRDF Fire Station Microwave Tower Coverage including infringements / development

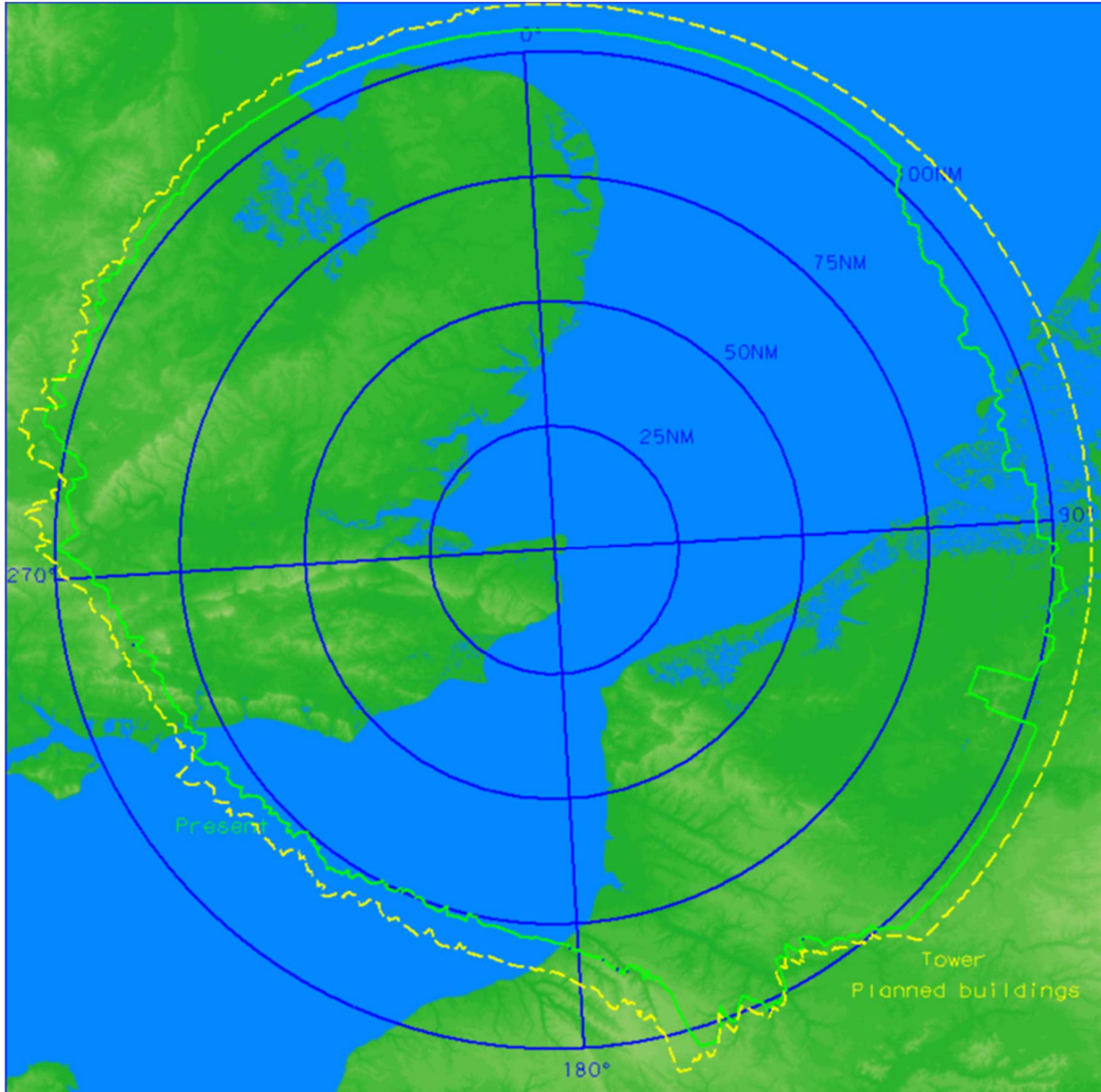


Figure 13 - HRDF Fire Station Microwave Tower Coverage

4.36 HRDF - Fire Station 2 location



Figure 14 - HRDF Fire Station 2 location

- 4.37 An alternative location was looked at in the same field in which a HRDF could be located on its own tower.
- 4.38 This would have the advantage of isolating it from the current systems on the Microwave Tower but comes with equal disadvantages of laying in power and comms plus having to perform civil works for a standalone tower.
- 4.39 Initially, the modelling gave favourable results with the antenna situated at 12 meters. However, after modelling with infringements and proposed building development it became rapidly apparent that the Hangers proposed in the aerodrome development impose a degradation on performance across an arc from South East to South West.
- 4.40 This site has therefore been discounted. Modelling (terrain only and with the development) is shown in Figures 15 and 16.
- 4.41 The location at Northern Field provides a different bearing for the reduction in performance (but the reduction is still experienced) and would substantially be in filled by the HRDF at Thorney Island. However, since Auto Triangulation requires 2 HDRFs, this location was also discounted without further analysis.

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4.42 HRDF Fire Station 2 Coverage - Terrain Only

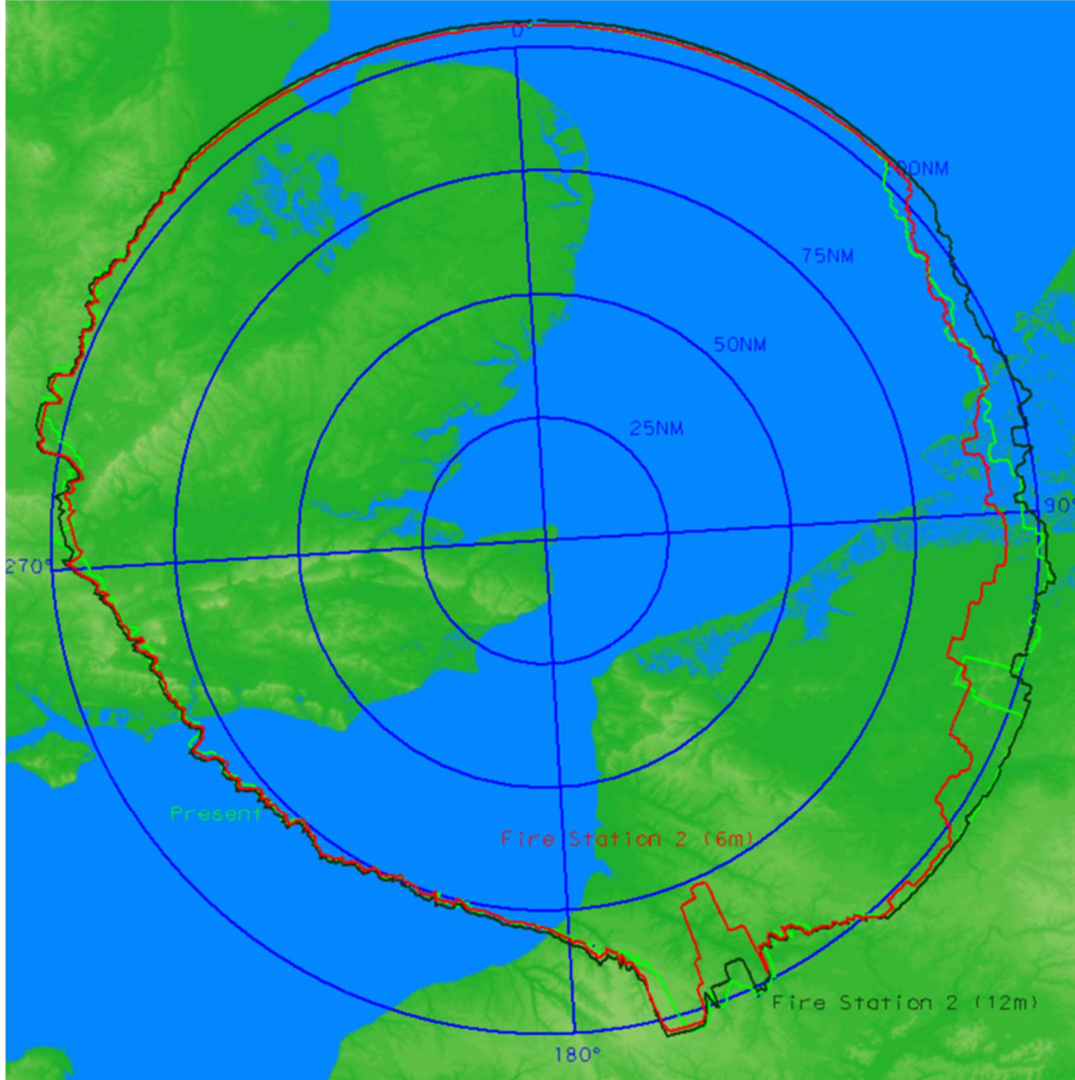


Figure 15 - HRDF Fire Station Site 2 Coverage

4.43 HRDF Fire Training Site 2 Coverage - Including Terrain and Planned Development

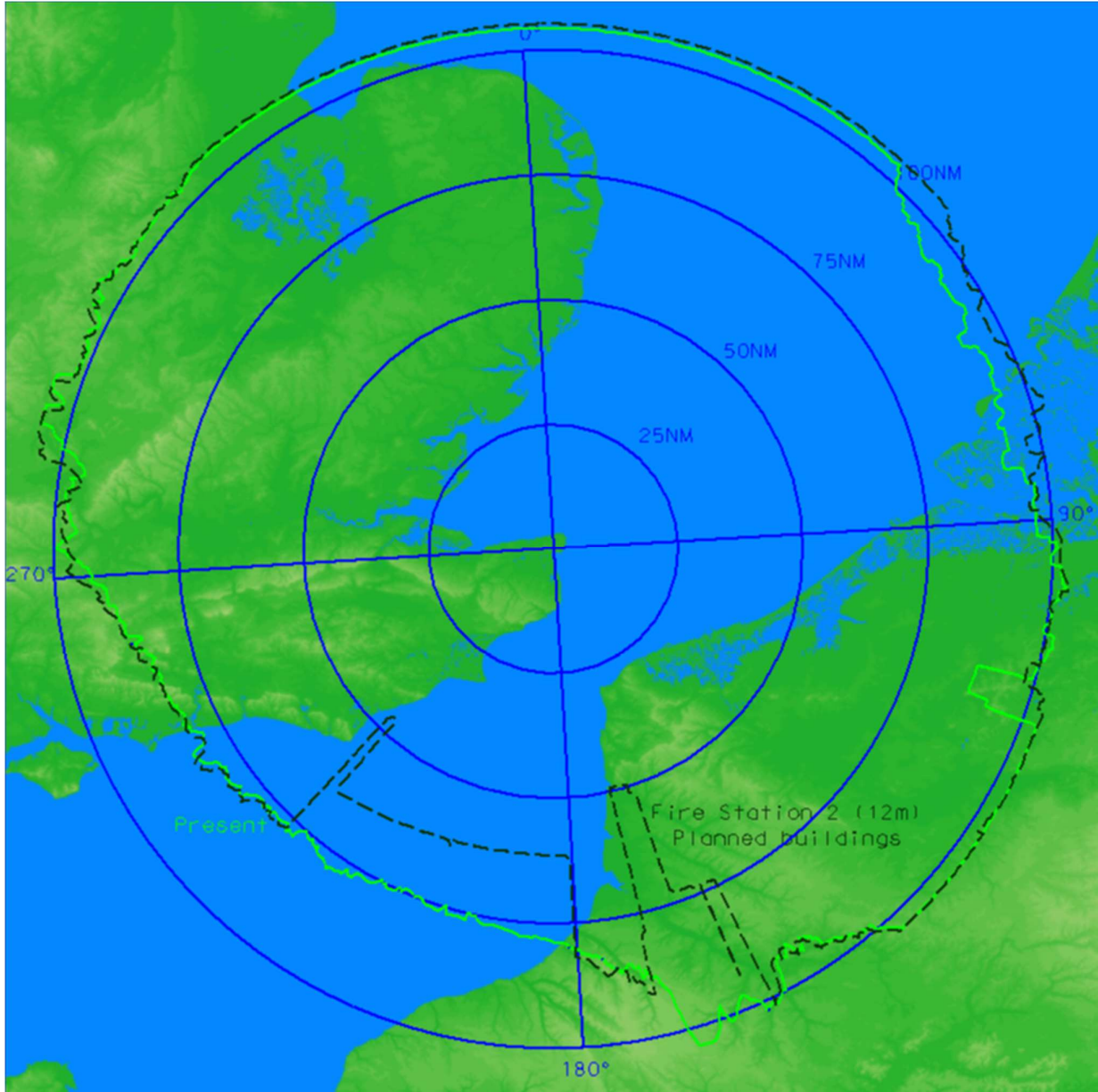


Figure 16 - HRDF Fire Station 2 Coverage

4.44 HRDF - Fire Station 1 location



Figure 17 - HRDF Fire Station 1 location

- 4.45 This location was modelled to determine the change in bearing (effect) of development experienced at Fire Station 2 and to see if the network coverage would compensate for this.
- 4.46 Unfortunately, the development is so close to both sites that the change is minimal and not absorbable. This site was therefore discounted without further analysis.

4.47 HRDF – New ATC tower location



Figure 18 - HRDF New ATC tower location

- 4.48 As part of the proposed development works at Manston, a new ATC Control Tower is to be erected.
- 4.49 Whilst it is not possible to Survey this location as it does not exist, it is assumed that sufficient power and comms infrastructure would be in place to allow the ATC Control Tower to operate.
- 4.50 Additionally (since it is a Control Tower), this would be a secure area and is significantly elevated according to the proposal documents.
- 4.51 Modelling has been performed on this location and coverage is significantly better than the current location.
- 4.52 Additionally, at this height (as with the Microwave Tower), the impact of development is negligible.
- 4.53 The predicted coverage for a HRDF on top of the ATC Control Tower Capula is shown in Figure 19 and would be a highly desirable location – notwithstanding that this building remains to be developed.

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4.54 HRDF New ATC Tower Coverage - Terrain and Planned Developments

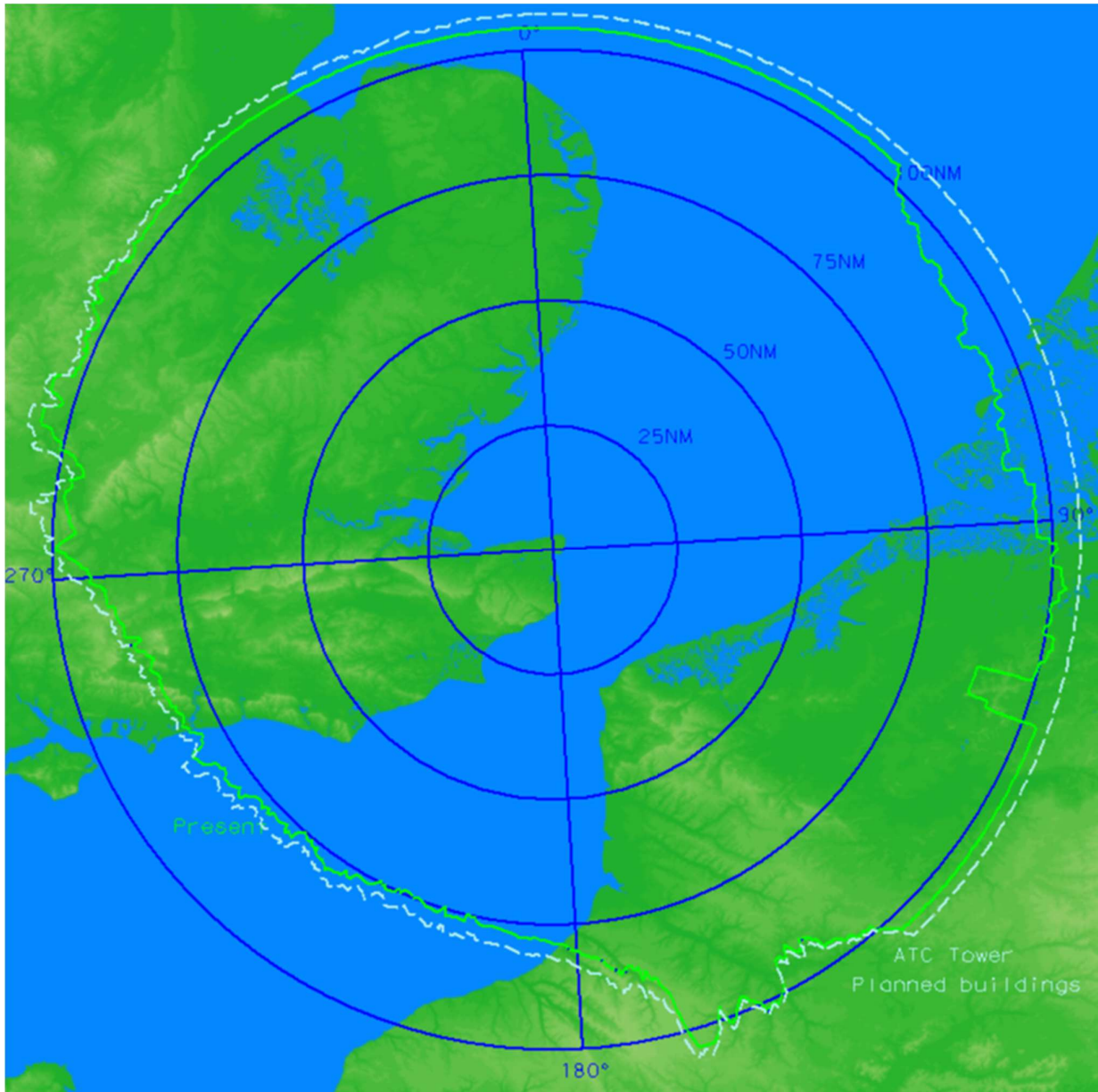


Figure 19 - HRDF New ATC tower coverage

5. LIDAR SURVEY

- 5.1 A Lidar Survey has been performed based on the Fire Station 2 Location and this determines the Infringements expected.
- 5.2 A full Report is provided separately with all Infringements identified individually and the extent to which they infringe analysed.
- 5.3 The following figures provide screen shots in a more understandable form and based on an individual tower in the Fire Station Field at an elevation of 12 meters.
- 5.4 Figure 20 shows the infringements based on the current protection criteria from JSP 604 which is outlined earlier in this report. This criterion is also based on a counter-poise antenna as is the current design.
- 5.5 Figure 21 shows the infringements based on a modern antenna array which assumes the ground plane to be horizontal with the base of the antenna.
- 5.6 It should be noted that in the case of the Microwave Tower or the ATC Control Tower both are sufficiently elevated that there are no infringements.

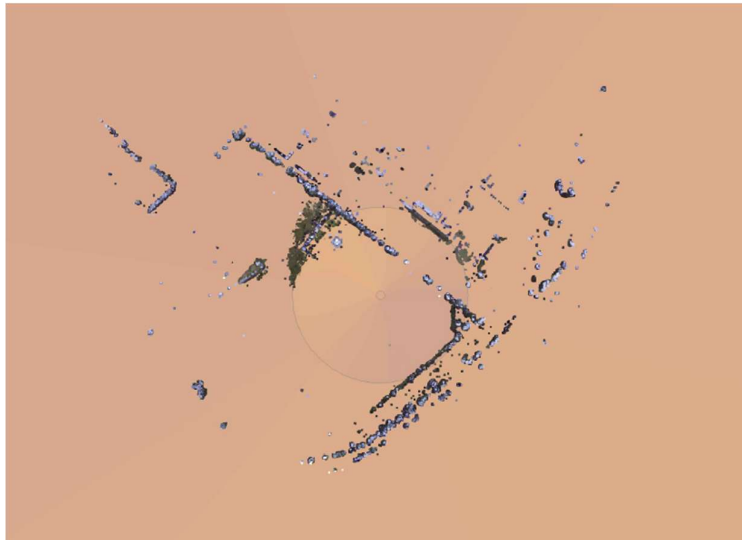


Figure 20 – Infringements per JSP 604 at Fire Station Field

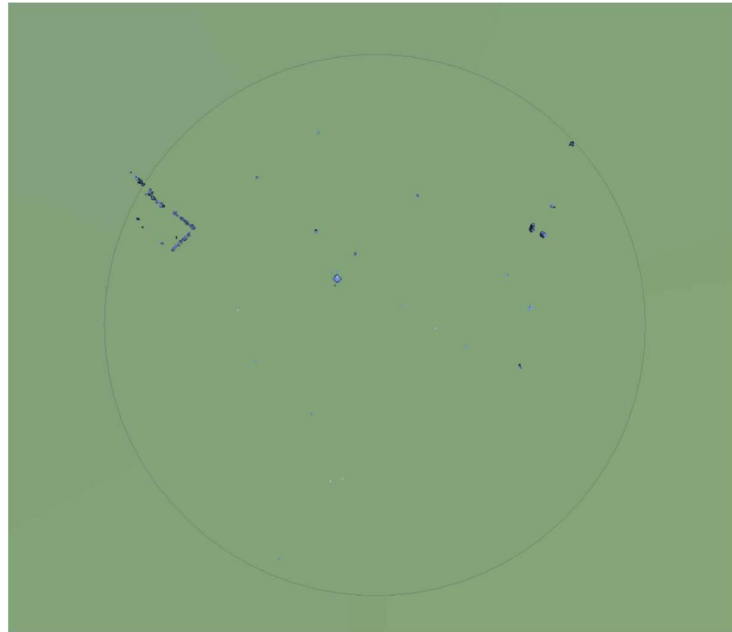


Figure 21 – Infringements with Horizontal Ground Plane

6. CONCLUSIONS / RECOMMENDATIONS

The preferred locations for the relocation of the Manston HRDF are summarized in the Table below:

Site	Preferred Location	Coordinates	Advantages	Disadvantages
New ATC Tower	1	51°20'50.60"N 1°20'43.92"E	Location is in the Proposed Development Area Comms and Power available from tower Easy to Maintain Good coverage Continuity of the Service Equipment will be in ATC (secure) No separate planning application No GEO survey required	Development prior to Installation HRDF loading factored into design of the ATC tower Hangars can cause reflections which may need mitigating New HRDF system required
Fire Station Microwave Tower	2	51°21'14.44"N 1°21'13.11"E	Location on MOD land Best coverage Existing mast utilised Power and comms are near to the tower Relocation can be done before development Future developments will not affect coverage Continuity of the service No GEO survey required	Installation at height Maintenance at height Contract with Arqiva Access and permissions to climb System requires a secured housing New HRDF system required Planning application required
Radar Tower	3	51°21'9.62"N 1°21'27.77"E	Location on MOD land Good coverage Easy to Maintain Location is not near buildings Existing mast utilised Power and comms are at the tower Relocation can be done before development Future developments will not affect coverage Continuity of the service No GEO survey required	Site Earmarked for new Radar Power and comms Need rehabilitating New HRDF system required

- 6.1 The 3 sites listed above are all viable alternatives and provide better coverage than the current location of the HRDF.
- 6.2 The Definition Phase will determine the final preferred location in conjunction with all required Stakeholders.



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