



Hornsea P2 Wind Farm Safety Assessment: North Coates Airfield

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Executive Summary

SMart Wind Limited (SMart Wind) is proposing to develop the Project 2 Offshore Wind Farm, the second proposed development within the Hornsea Offshore Wind Farm zone. Following design evolution and stakeholder engagement, concerns have been raised in terms of the potential impacts on aviation operations conducted at North Coates Airfield, which lies adjacent to the proposed onshore cabling route for the Wind Farm. The underground cabling requires various temporary supporting infrastructure during its installation (i.e. drilling rigs, water pumps and portacabins), to be contained within a number of planned Work Compounds. As such, the installation works has the potential to present a physical obstruction to aircraft operating at the unlicensed Airfield.

SMart Wind recognises there is a possibility that aircraft operating from North Coates Airfield have the potential to be affected. To address this, Osprey Consulting Services Ltd (Osprey), on behalf of SMart Wind, has conducted an Aviation Safety Assessment that considers the potential impact of the proposed temporary installation infrastructure on the operations associated with North Coates Airfield and identifies possible mitigation options, if required.

The purpose of this report is to determine whether the installation works poses an additional risk to any aviation operations conducted at North Coates Airfield. In the first instance, an Operational Evaluation was carried out which has determined the following:

- North Coates Airfield and the proposed Work Compounds are located within Class G uncontrolled airspace. Pilots operating under Visual Flight Rules (VFR) are ultimately responsible for their own obstacle clearance and are required to be clear of cloud and in sight of the ground at all times; Civil Aviation Authority (CAA) document Civil Aviation Publication (CAP) 493 *Manual of Air Traffic Services – Part 1* [Reference 1] stipulates the Visual Meteorological Conditions (VMCs) required for aircraft to operate under VFR.
- The proposed Work Compounds and associated installation infrastructure, which is anticipated to reach a maximum height of 10 metres (m) above ground level (agl) for a period of up to 6 months, will not breach any of the safeguarded Obstacle Limitation Surfaces (OLS), as stipulated in the CAA document CAP 168 *Licensing of Aerodromes* [Reference 2].
- It is acknowledged that obstacles may be difficult to visually acquire from the air, particularly during busy and critical stages of flight, such as on approach to land and following take-off. However, it is noted that aircraft at North Coates Airfield operate in the presence of existing buildings, located at closer range to the runway than the proposed Work Compounds. By the continued operation of the Airfield, it is suggested that should pilots be effectively notified, they are able to operate in the presence of low-height obstacles.

Following this analysis, and to confirm the evaluation findings, Osprey conducted a Safety Assessment of the potential impact of the proposed Work Compounds at North Coates Airfield. The Safety Assessment employs a qualitative risk based approach in accordance with guidance contained in CAP 760 *Guidance on the Conduct of Hazard Identification, Risk, Assessment and the Production of Safety Cases* [Reference 3] and the criteria against which the assessment has been carried out are contained in Annex 2. Osprey has conducted such assessments for many



airfields / airports in the UK, to identify any potential impacts on operations. This type of assessment is appropriate in terms of North Coates, with any potential safety risks as a result of the Hornsea P2 Wind Farm cabling installation works considered, and operational mitigation identified.

Assessment Conclusions

It must be noted that SMart Wind have sought a cautious approach to North Coates Airfield, and hence the safeguarding regulations for a licensed aerodrome, given in CAP 168, have been applied; the Safety Assessment conclusions and mitigation is proposed on a 'worse-case' scenario basis.

The Safety Assessment concludes that the risk to any potential operations at North Coates Airfield, associated with the Work Compounds of the Hornsea P2 Wind Farm cabling installation, can be classed as **Acceptable** in accordance with the Safety Criteria (Annex 2). The risks at North Coates Airfield cannot be claimed to be As Low As Reasonably Practicable (ALARP) until the suggested mitigation is formerly implemented. The adoption of the mitigation within this report, would enable the risks to be declared as **Acceptable** and **ALARP** because all requirements for mitigation would have been met.

The recommended mitigation is the introduction of an approved Airfield / Contractor Briefing Procedure, with a daily briefing within the Works period, should North Coates Airfield be in operation. This will enable the required Works information and specific details, to be accurately captured and acknowledged by both parties, through the maintenance of a Work In Progress (WIP) Book. Following this, pilot notification of the installation works, as captured through the implementation of the Briefing Procedure, is required to enable familiarisation and safe flight planning. This is achievable through appropriate documentation and Club House notices. In addition, as a Prior Permission Required (PPR) procedure is operated for visiting aircraft, pilot notification should pose little difficulty as part of a verbal approval to land. The Mitigation Solutions presented identified in this Assessment are in accordance to industry practice and their implementation is no different from many UK airfields.

Recommendations

As a result of the analysis undertaken, as detailed in this report, Osprey recommends the following:

- The Local Planning Authority (LPA) is to be advised that the Safety Assessment determined North Coates Airfield's operations could continue with an acceptable level of risk associated with the presence of the Work Compounds. The risks could be declared ALARP following implementation of the suggested mitigation.
- North Coates Flying Club is further engaged to discuss the implementation of the Mitigation Solutions presented within this report.



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1 Introduction

This section introduces the background, purpose and scope of this Safety Assessment report.

1.1 General

SMart Wind is proposing to develop the Hornsea Project 2 Offshore Wind Farm, the second proposed development within the Hornsea zone. The offshore development is anticipated to have a total generating capacity of up to 1.8 gigawatts (GW). Following design evolution and stakeholder engagement, concerns have been raised in terms of the potential impacts on aviation operations conducted at North Coates Airfield, which lies adjacent to the proposed onshore cabling route for the Wind Farm.

The underground cabling required for the Hornsea Project 2 Offshore Wind Farm requires various supporting infrastructure during its installation (i.e. drilling rigs, water pumps and portacabins), to be contained within a number of planned temporary Work Compounds. As such, the installation works has the potential to present a physical obstruction to aircraft operating at the Airfield.

SMart Wind recognises there is a possibility that aircraft operating from North Coates Airfield have the potential to be affected. To address this, Osprey, on behalf of SMart Wind, has conducted an Aviation Safety Assessment that considers the potential impact of the proposed installation infrastructure on the operations associated with North Coates Airfield. The results of the assessment are presented in this report.

1.2 Purpose and Scope

The purpose of this report is to identify the potential impact of the proposed temporary infrastructure required for the installation works in terms of cabling for the Hornsea Project 2 Offshore Wind Farm, on the operations conducted at North Coates Airfield. No other aviation stakeholders have been considered within this assessment.

1.3 Document Structure

The report utilises the following structure:

- Section 1 (this section) introduces the report;
- Section 2 provides details of the Hornsea Project 2 Offshore Wind Farm cabling installation works;
- Section 3 introduces North Coates Airfield;



- Section 4 considers the Potential Impacts on operations at North Coates Airfield;
- Section 5 outlines the identified Mitigation Solutions; and
- Section 6 provides the Conclusions and Recommendations drawn from the analysis.

All references are listed at the end of the document.

There are three following Annexes, which include:

- Annex 1 contains the methodology for the conduct of a safety assessment of the proposed development. This is followed by the actual Safety Assessment;
- Annex 2 presents the safety criteria against which the assessment has been carried out; and
- Annex 3 contains a set of scenario worksheets used by Osprey to conduct the hazard identification process for North Coates Airfield.



2 Hornsea P2 Offshore Wind Farm

This section gives an overview and location details of the proposed Hornsea P2 Offshore Wind Farm cabling installation works.

2.1 Overview

Smart Wind is proposing installation works for underground cabling to support the Hornsea Project 2 Offshore Wind Farm. The works are to be undertaken in the vicinity of North Cotes village near Grimsby, Lincolnshire, with the cable installation proposed to the southeast of the runway at North Coates Airfield. The location of the cable and temporary supporting installation infrastructure is shown at Figure 1.

As detailed at Figure 1, the HDD Compounds (shown in brown) are anticipated to contain temporary obstacles of heights up to a maximum of 10 m agl, for a period of up to 6 months. The Construction Compounds (shown in pink, green and orange) will contain installation equipment, up to a maximum height of 5 m agl. The North Coates Airfield boundary and area is marked in light green.

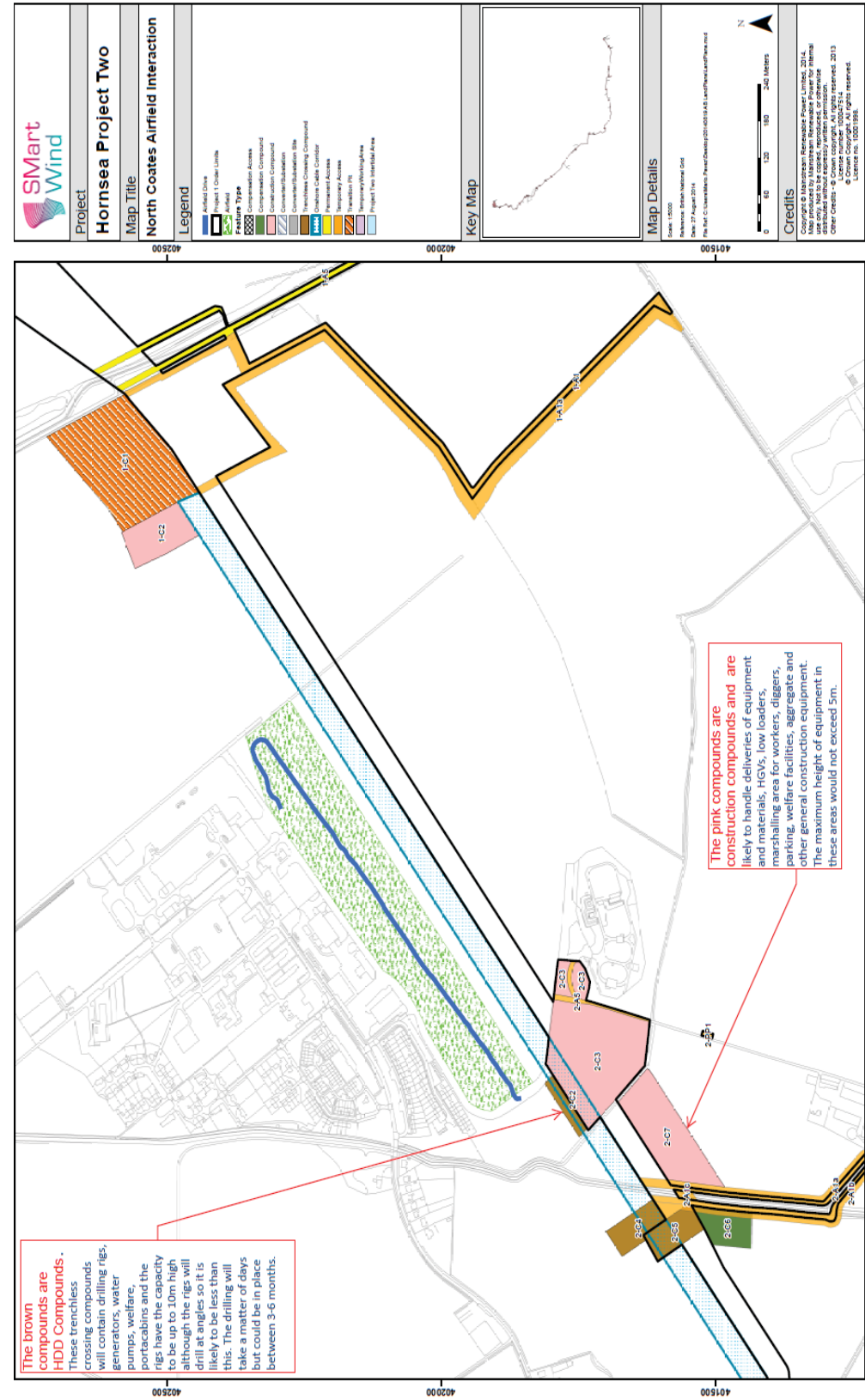


Figure 1: Proposed P2 Hornsea Wind Farm cabling installation Work Compounds in relation to North Coates Airfield (shown in light green). Figure kindly provided by Smart Wind Limited.



3 North Coates Airfield

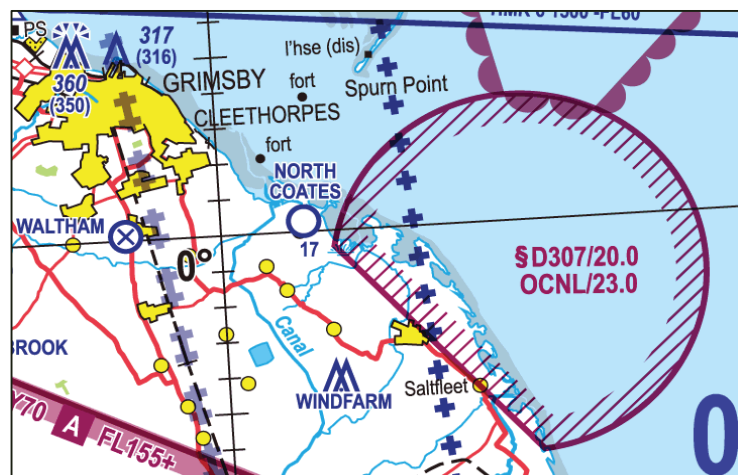
This section introduces North Coates Airfield, its runway configuration, operating procedures and potentially applicable safeguarding considerations.

3.1 Overview

North Coates Airfield is located approximately 11 km southeast of Grimsby and approximately 2.5 km northeast of North Coates village, Lincolnshire. The Airfield is operated by North Coates Flying Club and provides a base for General Aviation (GA) and Club flights.

3.2 Runways

North Coates Airfield consists of a single unlicensed grass runway of approximate maximum length 760 m and orientation of 05/23 [Reference 4]. North Coates is located within Class G uncontrolled airspace¹; the location of North Coates in relation to the local airspace environment is shown at Figure 2.



UK Civil Aviation Authority (CAA), VFR Chart North, 500,000, March 2014. Figure 2: Location of North Coates Airfield

¹ Airspace in the UK is divided into Controlled Airspace (Classes A-E) and uncontrolled airspace (Classes F and G). Within Class G uncontrolled airspace, any aircraft can enter and transit the airspace without Air Traffic Control (ATC) clearance and are subject only to a small set of mandatory rules [Reference 5]. Aircraft operating in this area may be receipt of Flight Information Services, with standard separation provided where possible; however, pilots are ultimately responsible for their own terrain and obstacle clearance.



3.3 Operating Procedures

Any aircraft operating at North Coates will do so under Visual Flight Rules (VFR²). Under these rules, pilots can be in receipt of an Air Traffic Service (ATS) and may be provided with traffic information, but ultimately are responsible for their own separation from other aircraft, obstacles and terrain. Aircraft operating under VFR do so within Visual Meteorological Conditions (VMC); CAP 493 *Manual of Air Traffic Services – Part 1* stipulates the VMCs required for aircraft to operate under VFR. For VFR flight within the Class G uncontrolled airspace, aircraft are required to remain clear of cloud and in sight of the surface at all times [Reference 1].

North Coates Airfield operates a visual circuit pattern, which is stipulated to be established at 500 feet³ (ft), conducted to the southeast of the runway [Reference 4]. Visual circuits are typically employed for the safe and expeditious flow of traffic in the vicinity of an aerodrome, where high concentrations of aircraft may be operating; therefore, the use of the circuit at North Coates Airfield is subject to traffic levels.

As shown at Figure 2, North Coates Airfield is located in proximity to Danger Area D307, which comprises of the Donna Nook Range, established from surface level to 20,000 ft above mean sea level (amsl), or up to 23,000 ft with prior notification [Reference 6]. North Coates inbound and departing aircraft are required to contact Donna Nook Range and, when active, descend to circuit height (500 ft) within 2 Nautical Miles (NM) of the Airfield.

In addition to providing services to Club aircraft, visiting aircraft are able to operate at North Coates Airfield, but are required to adhere to a Prior Permission Required (PPR) procedure.

3.4 Safeguarding

Guidance provided to unlicensed aerodromes in terms of safeguarding is limited. There is no regulatory oversight for unlicensed aerodromes, but such aerodromes are encouraged to lodge safeguarding maps with the Local Planning Authority (LPA), in the CAA document CAP 738 *Safeguarding of Aerodromes* [Reference 7]. Where they do, it is likely they will reference CAP 168 *Licensing of Aerodromes* [Reference 2], specifying the criteria for the safeguarding of licensed aerodromes. It should be noted that, to SMART Wind’s knowledge, North Coates Flying Club have not formerly lodged a Safeguarding Map with their LPA.

In the absence of a North Coates Safeguarding Map, Osprey has assessed the unlicensed Airstrip against the criteria within CAP 168, as a ‘worse-case’. However, it must be noted that the guidance provided for Obstacle Limitation Surfaces (OLS) in

² Visual Flight Rules (VFR) comprise of Rules 25 to 31 of the Rules of the Air Regulations. VFR flight is permitted in Visual Meteorological Conditions (VMC) during daytime within UK airspace (except that which is designated as Class A airspace).

³ Note that in the aviation industry, Air Traffic Controllers and pilots use feet (ft) and nautical miles (NM) for measurement in the air (altitude, range) but lengths on the ground e.g. runway lengths, are given in metres (m). Equivalent alternative units will be given only when it is appropriate to do so.



CAP 168 may be more stringent than the safeguarding requirements that might actually be in place at an unlicensed aerodrome. Nevertheless, CAP 168 requirements provide an indication of any impacts, should a similar safeguarding process be applied to the Airfield.

Licensed aerodromes are required to define a number of complex OLS that are particular in most cases to the main runway, its length and intended use. The safeguarded areas are represented by a number of complex 2-dimensional (D) planes and 3-D shapes around the aerodrome, which describe the limits of any obstacles in the aerodrome's vicinity. The absence of obstacles within these areas contributes to the safety of flight operations.

If the regulations stipulated in CAP 168 are applied to North Coates Airfield, a runway of less than 800 m would indicate an Aerodrome Reference Code of 1. Based upon the assumption of a Code 1 non-instrument runway, the distance the OLS would extend from the mid-point of North Coates runway is 2.7 km, as shown at Figure 3.

Please note, only those surfaces relevant to the assessment of North Coates Airfield have been including in the following sections.

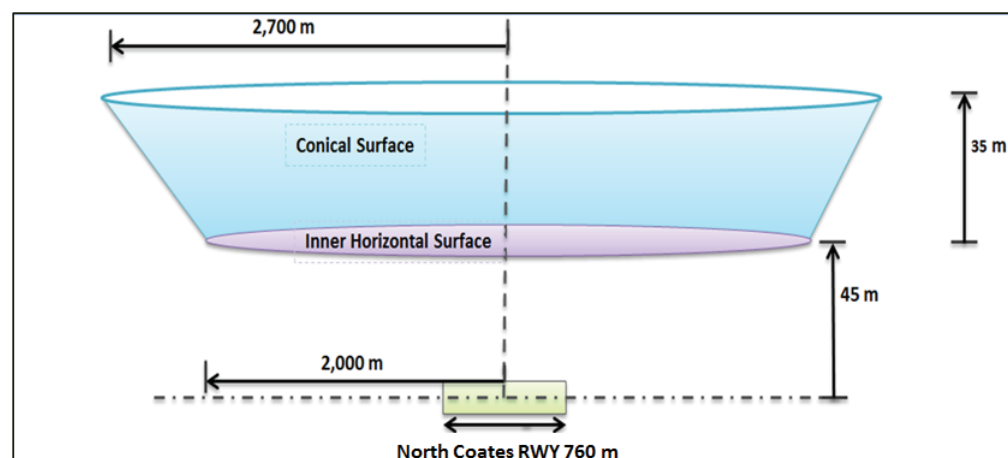


Figure 3: Diagrammatic Representation of the CAP 168 OLS Regulations Applied to North Coates Airfield.

3.4.1 OLS – Take-Off Climb / Approach Surfaces

A take-off climb surface is established for each runway direction that is used for take-off and is an inclined plane situated beyond the end of the take-off run available. The two ends of the take-off climb surface (the inner and outer edge) are perpendicular to the extended centreline⁴ of the runway, with the two sides diverging uniformly until they reach a maximum width, at which point they parallel the extended centreline.

⁴ The extended centreline is a straight line continuing in the direction of the runway representing the track followed by an aircraft taking off straight ahead.

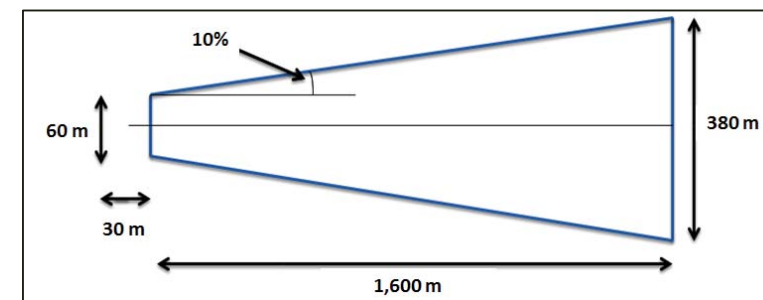


Figure 4: Diagrammatic Representation of the Lateral Dimensions of the North Coates Take-Off Climb / Approach Surfaces

The slope of the surface is determined by the runway code; for a Code 1 airfield such as North Coates, the slope is 5%. The North Coates take-off climb surface inner edge starts 30 m from the end of each runway, and the sides diverge at a rate of 10% until 380 m apart, resulting in a total length of 1,600 m as depicted at Figure 4.

For a Code 1 airfield, the dimensions of the approach surface are equal to those for the take-off climb surfaces; the approach surface for North Coates Airfield is also shown at Figure 4.

3.4.2 OLS – Transitional Surfaces

Transitional surfaces are established for every runway intended to be used for landing. The slope of a transitional surface is measured in the vertical above the horizontal, and normal to, the runway centreline. For a Code 1 non-instrument runway such as North Coates, the slope is 20%.

To calculate the transitional surface, the elevation of any point on the lower edge along the approach surface, is equal to the elevation of the approach surface at that point. The outer limit of the transitional surface is determined by its intersect with the plane of the Inner Horizontal Surface (IHS).

3.4.3 OLS – Inner Horizontal Surface

An IHS is a specified portion of a horizontal plane around an aerodrome, from beyond which the Conical Surface extends as depicted at Figure 3. It represents the level above which consideration needs to be given to the control of new obstacles to ensure safe manoeuvring in the vicinity of an aerodrome.

Should the regulations for licenced aerodromes as contained within CAP 168 be applied to North Coates, the IHS would extend laterally from the runway mid-point out to radius of 2,000 m (based on an Aerodrome Reference Code of 1, non-instrument). The IHS is situated 45 m above the declared runway elevation of approximately 17 ft (approximately 5 m) amsl, which equates to an IHS vertical constraint of 50 m amsl.



4 Potential Impacts

This Section assesses and summarises the potential impacts of the proposed cable installation works in terms of the current operations and safeguarding requirements at North Coates Airfield.

4.1 Operational Procedures

The proposed Hornsea P2 cabling installation works and supporting infrastructure are contained within defined Work Compounds, as shown at Figure 1. The Compounds are anticipated to be located to the northeast and southwest of the North Coates runway, offset to the south of the centreline, with the nearest compound, 2C2, located approximately 130 m southwest of the runway 05 threshold (measured to the nearest corner-point). As a result of the low height of the temporary installation infrastructure (10 m agl maximum assembly) outside of the Airfield boundary, it is considered that the installation works will pose a manageable impact on operations. Although aircraft will be operating in the vicinity of the Work Compounds, it is noted that there are a number of hanger buildings and residential properties to the north of the runway, which are located within closer proximity than the proposed Work Compound infrastructure. By the continued operation of the Airfield in the presence of these buildings, it is noted that these structures do not pose an impact on aircraft safety.

Despite this, it is acknowledged that obstacles can be difficult to visually acquire from the air, particularly whilst undertaking busy and critical stages of flight, such as an approach to land or immediately after departure. Therefore, appropriate notification is essential, enabling pilot familiarisation and increasing awareness for visiting aircraft.

4.2 Infringement of Protected Surfaces

As a result of the range of the proposed cabling installation equipment from the runway at North Coates, the Work Compounds have been assessed in terms of CAP 168 OLS, as a 'worse-case' scenario. Only those Work Compounds which have the potential to breach the OLS have been considered within this section; namely HDD Compounds 2C2 and 2C4, located to the southwest of the North Coates runway. Attention is drawn to Figure 1, Section 2.

Please note, the measurements given in this analysis are approximate to provide a representation of the proposed installation works infrastructure in relation to North Coates' OLS. Distances have been calculated based upon satellite imagery, utilising the most current data openly available; a full site survey is recommended to confirm the analysis.



4.2.1 HDD Compound - 2C2

The 2C2 Compound is likely to contain temporary obstacles of heights up to a maximum of 10 m, for up to 6 months. Assessment of the location of the 2C2 Compound, indicates that the area is approximately 50 m beyond the southern lateral boundary of the approach surface for runway 05, or take-off climb surface for runway 23 (measured from the nearest corner, to the north of the Compound). Please note, the runway 05 threshold has been taken from the edge of what appears to be the useable runway, based on satellite imagery, which displaces the Threshold further from the runway mid-point. This effectively shifts the runway towards the planned installation works, further providing a 'worse-case' scenario for the analysis. No breach of the approach / take-off climb surfaces is anticipated as a result of the 2C2 Compound.

The transitional surface in the region of the 2C2 Compound, stretches from the outer edge of the approach surface, up to the inner edge of the IHS, established at 50 m amsl.

The approach surface, measured at right angles to the extended runway centreline, is established at an altitude of approximately 8.2 m amsl (based on a distance of 64 m). As detailed previously, the nearest northerly corner of the 2C2 Compound, is located approximately 50 m beyond the edge of the runway 05 approach surface. This equates to a transitional surface at approximately 18 m amsl, resulting from the vertical extension of the transitional surface (10 m) beyond the altitude of the approach surface boundary (8.2 m). Therefore, no breach of the transitional surface is anticipated as a result of the 2C2 Work Compound and supporting infrastructure, which is anticipated to extend to a maximum altitude of 13 m (based on a Compound ground elevation of 3 m).

4.2.2 HDD Compound - 2C4

The 2C4 Work Compound, as shown at Figure 1, is located approximately 358 m west southwest of the North Coates runway, measured to the nearest corner-point. As detailed for Compound 2C2, 2C4 is likely to contain temporary obstacles of heights up to a maximum of 10 m (equating to approximately 13 m amsl), for up to 6 months.

Assessment indicates the 2C4 Compound is located within the lateral constraints of the runway 05 approach surface / runway 23 take-off climb surface. At a range of 325 m from the inner edge, measured at right-angles to the extended centreline, the approach surface is established at approximately 21 m amsl. As a result, no breach of the approach surface is anticipated. This result is indicative of the runway 23 take-off climb surface, which has the same established dimensions, as detailed at Section 3.4.1.

4.3 Further Safeguarding Considerations

The CAA document CAP 793 *Safe Operating Practices at Unlicensed Aerodromes* [Reference 8] contains guidance on the safety implications of obstacles within the vicinity of unlicensed aerodromes, such as North Coates Airfield. CAP 793 recommends that any potentially hazardous obstacles within 4 NM (7.4 km) of the centre of the aerodrome be published in any documentation in which the aerodrome is included and local pilots briefed to raise awareness. The proposed Hornsea P2



Wind Farm cabling installation Work Compounds would be situated within the CAP 793 capture area.

4.4 Impact Summary

None of the proposed Work Compounds, including HDD Compounds 2C2 and 2C4 which are anticipated to contain the tallest supporting infrastructures, at closest proximity, will lead to a breach of the North Coates Airfield OLS, should the regulations stipulated in CAP 168 for licensed aerodromes be applied.

Despite this, the proposed Hornsea P2 Wind Farm cabling installation Work Compounds are positioned in close proximity to the runway, such that the potential exists for operations at North Coates to be affected. It is considered that the effect on operations is determined to be manageable, so long as users of the Airfield are made aware of the location and height of the temporary obstacles.

To further clarify the issues surrounding North Coates, Osprey has conducted a Safety Assessment in accordance with CAA criteria. This is presented in Annexes 1-3. The results of the Safety Assessment suggest that the proposed Work Compounds and associated supporting infrastructure, would not present an unacceptable safety risk to aircraft operating in the vicinity of North Coates; the risk is categorised as **Acceptable**. However, this risk would not be As Low As Reasonably Practicable (ALARP). To reduce the risk to **ALARP**, the mitigation in the following section is proposed.



5 Mitigation Options

Suitable mitigation options in terms of the Hornsea P2 Wind Farm cable installation Work Compounds are presented within this section.

5.1 Overview

The introduction of an Airfield / Contractor Briefing Procedure and standard pilot notification are suggested for the mitigation of any impact of the installation works on the operations of North Coates Airfield. Implementation of these Solutions is anticipated to reduce to the effects of the proposed Work Compounds to ALARP.

5.2 Mitigation Solution 1: Airfield / Contractor Briefing Procedure

As previously stated in Section 4.1, although the impact of the proposed temporary Work Compounds and associated infrastructure is considered to be operationally acceptable, appropriate North Coates Airfield notification to pilots of the nature and duration of the cabling installation is considered essential.

To enable this, the introduction of a comprehensive Airfield / Contractor Briefing Procedure is suggested on a daily basis within the Works period, should North Coates Airfield be in operation, to enable the required information to be captured and acknowledged by both parties, through the maintenance of a Work In Progress (WIP) Book. The Briefing can be adapted as required, to include Work details such as:

- Limits of Work Area / active Compounds;
- Active routes to be used by works vehicles and parking areas;
- Direction of aircraft movements;
- Controls to be employed over works vehicles if required and signals to be utilised; and
- Foreign Object Damage (FOD) prevention initiatives.

This type of procedure is representative of industry practice; the process would typically be employed at a larger licensed aerodrome, with requirements contained in the Aerodrome Operating Manual.

5.3 Mitigation Solution 2: Notification and Pilot Familiarisation

As stated previously, all operations at North Coates are completed VFR in VMC and as such, pilots operating from the Airfield are responsible for maintaining their own separation i.e. pilots are obliged to be aware of any obstacles and avoid them by the stipulated margins. As mentioned at Section 4.1, pilots operating at North Coates Airfield are currently able to operationally manage the obstacles in the vicinity of the runway. Therefore, it is suggested that appropriate notification of the proposed temporary Work Compounds within airfield literature and within the Club House, would alert pilots to their whereabouts and aid flight planning, reducing any potential risk to aviation within the immediate vicinity. Effective notification will be



enabled through the provision of accurate information, as provided through the implementation of Mitigation Solution 1, detailed previously.

The notification of the Work Compounds would be required for the full duration of the cabling installation (up to 6 months), ensuring pilots are familiar with the location and nature of potential obstacles until the installation is declared complete. It is Osprey’s opinion that this would satisfy the requirements of CAP 793 [Reference 8].

Notification of visiting pilots is not expected to pose a difficulty, as the Airfield is locally operated, allowing for a PPR procedure. Therefore, this will enable pilots operating at the airfield to be briefed and made aware of the proposed Work Compounds and plan accordingly.

5.4 Mitigation Summary

It is considered that the implementation of Solution 1 (Airfield / Contractor Briefing Procedure) and Solution 2 (notification and pilot familiarisation), should provide sufficient mitigation for the temporary P2 Hornsea Wind Farm cabling installation. It is proposed that promulgation of accurate Work Compound details throughout Airfield publications and appropriate pilot notification, would reduce any risks imposed to ALARP. An Airfield / Contractor Briefing Procedure would ensure the information passed to pilots is accurate, and would enable an effective working relationship with the Airfield.



6 Conclusions and Recommendations

This section details the conclusions and recommendations drawn from the full range of analysis.

6.1 Overview

It is understood that the proposed onshore cabling route for the Hornsea P2 Offshore Wind Farm, lies adjacent to North Coates Airfield. The underground cabling requires temporary supporting infrastructure during its installation, which is to be contained within a number of planned Work Compounds. As such, the installation works has the potential to present a physical obstruction to aircraft operating at the Airfield.

SMart Wind recognises there is a possibility that aircraft operating from North Coates Airfield have the potential to be affected. To address this, Osprey, on behalf of SMart Wind, has conducted a Safety Assessment to determine any potential effects on flight operations.

6.2 Operational and Safety Impact

6.2.1 Overview

None of the proposed Work Compounds will lead to a breach of the North Coates Airfield OLS, should the regulations stipulated in CAP 168 for licensed aerodromes be applied. Despite this, the proposed Hornsea P2 Wind Farm cabling installation Work Compounds are positioned within proximity to the runway, such that the potential exists for operations at North Coates to be affected. It is considered that the impact on operations is determined to be manageable, so long as users of the Airfield are made aware of the location and height of the temporary obstacles.

As a result, the Safety Assessment suggests that the proposed Hornsea P2 Wind Farm cabling installation works would not present an unacceptable safety risk to aircraft operating at North Coates Airfield; however, the risks are not declared ALARP as there are some areas of mitigation for consideration and action.

6.2.2 Reducing the Risk to ALARP

To reduce the potential risks to North Coates Airfield to ALARP, mitigation solution options include the following:

- Mitigation Solution 1: Instigate a comprehensive Airfield / Contractor Briefing Procedure; and
- Mitigation Solution 2: Notification of Obstacles and Pilot Familiarisation.

6.3 Recommendations

As a result of the analysis undertaken, as detailed in this report, Osprey recommends the following:



- The LPA is to be advised that the Safety Assessment determined North Coates Airfield’s operations could continue with an acceptable level of risk associated with the presence of the Work Compounds. The risks could be declared ALARP following implementation of the suggested mitigation.
- North Coates Flying Club is further engaged to discuss the implementation of the Mitigation Solutions presented within this report.



7 References

Ref	Name	Origin
1	CAP 493 – Manual of Air Traffic Services – Part 1 Fifth Edition incorporating amendments to March 2014	CAA
2	CAP 168 – Licensing of Aerodromes Tenth Edition incorporating amendments to February 2014	CAA
3	CAP 760 – Guidance on the Conduct of Hazard Identification, Risk, Assessment and the Production of Safety Cases; For Aerodrome Operators and Air Traffic Service Providers First Edition, incorporating amendments to December 2010.	CAA
4	Pooleys VFR UK Flight Guide, Pooleys 2013.	Pooleys
5	CAP 393 – Air Navigation: The Order and the Regulations Third Edition incorporating amendments up to June 2014	CAA
6	UK Integrated Aeronautical Information Publication (UK IAIP) Amended to AIRAC 09/14	NATS
7	CAP 738 – Safeguarding of Aerodromes Second Edition incorporating amendments to December 2006	CAA
8	CAP 793 – Safe Operating Practices at Unlicensed Aerodromes First Edition July 2010	CAA

Table 1: Table of References



A1 Safety Assessment

A1.1 Overview

This section describes the Safety Assessment that has been conducted on operations at North Coates Airfield in the presence of the Hornsea P2 Wind Farm cabling installation Work Compounds and supporting infrastructure, which is likely to result in temporary low height obstacles, with a maximum planned height of 10 m agl.

The method used employs a qualitative risk based approach in accordance with guidance contained in CAP 760 *Guidance on the Conduct of Hazard Identification, Risk, Assessment and the Production of Safety Cases* [Reference 3] and the criteria against which the assessment has been carried out are contained in Annex 2.

If North Coates was a licenced airfield it would be required by the CAA to operate a Safety Management System (SMS). The guidance for a SMS is set out in international regulations, namely The International Civil Aviation Organisation (ICAO) Document 9859. The CAA publishes guidance on the production of a SMS which is based on ICAO document 9859. SMS Guidance, Section 5, states that one of the key components of a SMS is the Safety Risk component. The SMS guidance states:

“The safety risk management process starts with identifying hazards affecting aviation safety and then assessing the risks associated with the hazards in terms of severity and likelihood. Once the level of risk is identified, appropriate remedial action or mitigation measures can be implemented to reduce the level of risk to as low as reasonably practicable. The implemented mitigation measures should then be monitored to ensure that they have had the desired effect. It is important to ensure a common standard and process for Hazard Identification Risk Assessment and Control is implemented throughout the organisation...”

Were North Coates licenced, they would operate an SMS and would be required to conduct a Safety Assessment of any change to their operating environment including the temporary assembly of obstacles within the Airfield vicinity. This is a process that applies to all licenced airfields regardless of size or intended operation.

Osprey has conducted over 200 evaluations and was the first Company to use the safety assessment as a way of identifying the likely impact on an airfield. We believe the Safety Assessment process can be used in this instance and is applicable to North Coates Airfield.

A1.2 Safety Assessment Method

In plain terms, the Safety Assessment process utilised by Osprey employs the following steps:

- Development of a Safety Claim which the Safety Assessment will seek to prove through Argument and Evidence;
- Hazard Identification: two or more subject matter experts (representing technical, operational and air traffic control expertise) will jointly identify the hazards associated with the relative location of the low height obstacles and the airfield. Mitigation is also identified at this stage;



- Cause Consequence Analysis: The same experts will identify the causes of the hazards and the most dominant outcome e.g. collision, near-miss event etc;
- Risk Assessment: The frequency of the consequence occurring, combined with the severity of that consequence, enables classification of the risk according to the safety criteria derived from CAP 760 [Reference 3];
- The results of the risk assessment are fed back into the Safety Claim to determine whether the argument for continued safe operations at the airfield can be made.

A1.3 North Coates Safety Claim, Argument and Evidence

The overarching safety claim, which must be supported by argument and evidence, is that the continued operations at North Coates Airfield will be safe in the presence of the installation works supporting infrastructure. This claim is supported by three sub-claims:

- Claim 1 - Existing operations at North Coates are safe;
- Claim 2 - The presence of the cabling installation Work Compounds and supporting infrastructure shall result in an insignificant increase in risk over the current level;
- Claim 3 - The additional risk is demonstrated to be ‘Acceptable’ and ‘As Low As Reasonably Practicable’ (ALARP).

Claim 1 is supported by the continued current safe operation of the Airfield by North Coates Flying Club.

Claims 2 and 3 are the subject of the safety assessment as presented in this report.

A1.4 Hazard Identification Method

The identification of hazards is based upon the systematic study of three scenarios associated with operations at North Coates:

- Scenario 1: Aircraft approaches runway 05;
- Scenario 2: Aircraft departs runway 23;
- Scenario 3: Aircraft operating within the visual circuit pattern at North Coates Airfield.

Osprey used a set of worksheets to explore each scenario and identify any hazards that could be directly attributed to the installation works. The worksheets are contained in Annex 3.

A1.5 Cause-Consequence Analysis

The hazards identified from analysis of the scenarios described have been developed to identify the consequences of each hazard occurring (potential accidents / incidents) and their main underlying causes. This has been done by identifying the conditions or mitigations that prevent a hazardous event developing to an accident, or other safety significant incident.

The cause-consequence notes can also be seen in the worksheets of Annex 3.



A1.6 Risk Assessment

To provide an assessment of the overall risk for each consequence, the identified hazards and proposed mitigation have been evaluated using the criteria described in Annex 2. The results of this assessment are shown at Table A1.1, under the column heading Risk Class.

A1.7 Results of Hazard Identification

The results of the analysis identify one hazard that could specifically be attributable to the proposed Installation Works Infrastructure, as detailed below:

Hazard 1: VFR traffic operating within the vicinity of North Coates Airfield may encounter obstacles due to the temporary works, presenting a physical obstruction to flight, particularly in poor weather conditions.

A1.8 Identified Mitigation

The analysis process identified two potential areas of mitigation that might apply to the scenarios:

Mitigation 1: Airfield / Contractor Briefing Procedure

Daily briefing procedure within the cabling installation period, should North Coates Airfield be in operation, to enable the required Work Compound information to be captured and acknowledged by both parties, through the maintenance of a WIP Book.

Mitigation 2: Notification and Pilot Familiarisation

Pilot notification of the installation works, as accurately captured through the implementation of Mitigation 1, could be achieved through appropriate documentation, Club House notices and the existing PPR procedure for visiting aircraft.

A significant reduction in safety implications owing to the Work Compounds is anticipated as a result of the implementation of the aforementioned mitigation solutions.

A1.9 Safety Assessment Conclusions

The Safety Assessment concludes the risks to North Coates Airfield associated with the Hornsea P2 Wind Farm cabling installation, as detailed at Section 2, can be classed as **Acceptable** in accordance with the Safety Criteria (Annex 2) but cannot be claimed to be ALARP because the suggested mitigation requires to be formerly implemented.

The adoption of the mitigation within this report would enable the risks to be declared **Acceptable** and **ALARP**, as a result of all requirements for mitigation having been met. The recommended mitigation (Solution 1) is to introduce an Airfield / Contractor Briefing Procedure and the maintenance of a WIP Book, and the implementation of standard methods to address pilot awareness of the works i.e. identification of the Work Compounds locations and nature within the normal channels used by pilots for flight planning.



Hazard Ref	Description	Scenario	Consequence Severity	Consequence Probability	Risk Class
H1	Hazard 1: VFR traffic operating within the vicinity of North Coates Airfield may encounter obstacles due to the temporary works, presenting a physical obstruction to flight.	Aircraft approaches runway 05; Aircraft departs runway 23; Aircraft operating in within the visual circuit pattern.	Major Major Major	Extremely Remote Extremely Remote Extremely Remote	Acceptable Acceptable Acceptable

Table A1.1: Consequence and risk assessment summary



A2 Safety Criteria

A2.1 Overview

In order to provide an objective baseline for the Risk Assessment, the following criteria have been derived from CAP 760 [Reference 3].

A2.2 Qualitative Probability Definition

The probability of an event occurring has been assessed using the definitions from Table 2 of CAP 760. These are summarised in Table A2.1 below.

Probability of Event	Qualitative Definition	Quantitative Definition
Extremely Improbable	Should virtually never occur	Never (0)
Extremely Remote	Very unlikely to occur	Once in 1,000 + years
Remote	Unlikely to occur during the operational life of the system.	Once in 10-1,000 years
Reasonably Probable	May occur once during the total operational life of the system	Once in 40 days to once in 10 years
Frequent	May occur once or several times per year	Once per hour to once in 40 days

Table A2.1: Probability Definitions

A2.3 Severity Classification Scheme

The severity of an event occurring has been assessed using the definitions derived from Table 2 of CAP 760. These are summarised in Table A2.2 below.

Class	Definition
Accident	Accident – as defined by Council Directive 94/56/EC for Air Traffic Services. Includes multiple serious injury or death to staff/ members of the public; substantial damage to major facilities.
Serious Incident	Serious Incident – as defined by Council Directive 94/56/EC for Air Traffic Services. An event where an accident nearly occurs. No safety barriers are remaining. The outcome is not under control and could very likely lead to an accident. Damage to major facilities. Serious injury to staff/ members of the public.



Major Incident	A major incident associated with the operation of an aircraft, in which the safety of the aircraft is compromised, resulting in a near collision between aircraft, ground or obstacles. A large reduction in safety margins. The outcome is controllable by use of existing emergency procedures/ equipment. The safety barriers are few, approaching none. Minor injury or damage.
Significant Incident	Significant incident indicating that an Accident, Serious or Major Incident could have occurred if the risk had not been managed within safety margins, or if another aircraft had been in the vicinity. A significant reduction in safety margins but several safety barriers remain to prevent an accident. Reduced ability of flight crew/ ATC to cope with the increase in workload as result of the conditions impairing their efficiency. Only on rare occasions can the occurrence develop in to an accident Nuisance to aircraft occupants, public or staff.
No Immediate Effect.	No immediate effect on safety. No direct or low safety impact. Existing safety barriers avoid the event developing.

Table A2.2: Severity Classification Scheme Definitions

A2.4 Tolerability of Hazardous Events

The consequence of a hazardous event of particular severity is considered tolerable provided it occurs below a given rate. The tolerability is determined on a societal basis and involves considerations of societal, environmental and political factors relevant to the operational environment. Table A2.3 shows the tolerability matrix used in this study, which derived from an example matrix in CAP 760 Table 4, Risk Classification/ Tolerability Matrix [Reference 3].

Probability Severity	Extremely Improbable	Extremely Remote	Remote	Reasonably Probable	Frequent
Accident	Review	Unacceptable	Unacceptable	Unacceptable	Unacceptable
Serious	Acceptable	Review	Unacceptable	Unacceptable	Unacceptable
Major	Acceptable	Acceptable	Review	Unacceptable	Unacceptable
Significant	Acceptable	Acceptable	Acceptable	Review	Unacceptable
No Effect	Acceptable	Acceptable	Acceptable	Acceptable	Review

Table A2.3: Tolerability Matrix



A3 Safety Assessment Worksheets

Scenario	1
Scenario	Aircraft routing in close proximity to the installation works supporting infrastructure whilst undertaking an approach to runway 05.
Hazardous Condition	Obstacles can be difficult to see from the air in certain meteorological conditions (low light levels). If the pilot has not spotted the obstacle, or is unaware of its existence, there is potential for an accident to occur.
Hazard	VFR/VMC traffic encounters man-made object within proximity to North Coates Airfield, whilst undertaking an approach to Runway 05.
Hazard Probability	Frequent
Consequence	Near miss incident; last minute avoidance seriously degrades safety margins; potential for collision with object.
Severity	Major
Mitigation	A typical final approach ground track will not be affected by the proposed Work Compounds; no breach of the safeguarded OLS Approach Surfaces is anticipated. Promulgation of temporary obstacle description, height and location in Airfield documentation and notices, should ensure that pilots are aware of any potential obstacles and aid in the planning of obstacle avoidance; Notification of the installation works by North Coates Flying Club to local and visiting pilots.



Scenario	1
Mitigating Failure Probability ⁵	Extremely Remote
Consequence Probability	Extremely Remote
Risk Class.	Acceptable
Notes	Traffic flying VFR/VMC are required to maintain adequate clearance of cloud and adequate flight visibility; factors which contribute to lowering potential of actual collision. OLS as defined in CAP 168 are stipulated from licenced aerodromes but have been applied to the unlicensed runway at North Coates as a 'worse-case' scenario.

⁵ Once mitigation is in place, how likely is it to fail? This represents the safety engineer's confidence in the chosen mitigation. In this case, the mitigation assumes a competent pilot, observing the rules of the ANO.



Scenario	2
Scenario	Aircraft routing in close proximity to the installation works supporting infrastructure whilst departing runway 23.
Hazardous Condition	Obstacles can be difficult to see from the air in certain meteorological conditions (low light levels). If the pilot has not spotted the obstacle, or is unaware of its existence, there is potential for an accident to occur.
Hazard	VFR/VMC traffic encounters man-made object within proximity to North Coates Airfield, following departure from Runway 23.
Hazard Probability	Frequent
Consequence	Near miss incident; last minute avoidance seriously degrades safety margins; potential for collision with object.
Severity	Major
Mitigation	A typical take-off ground track will not be affected by the proposed Work Compounds; no breach of the safeguarded OLS Take-Off Climb Surfaces is anticipated. Promulgation of temporary obstacle description, height and location in Airfield documentation and notices, should ensure that pilots are aware of the Work Compounds and aid in the planning of obstacle avoidance; Notification of the installation works by North Coates Flying Club to local and visiting pilots.
Mitigating Failure Probability	Extremely Remote
Consequence Probability	Extremely Remote
Risk Class.	Acceptable
Notes	Traffic flying VFR/VMC are required to maintain adequate clearance of cloud and have adequate flight visibility; factors which contribute to lowering potential of



Scenario	2
	actual collision. OLS as defined in CAP 168 are stipulated from licenced aerodromes but have been applied to the unlicensed runway at North Coates as a 'worse-case' scenario.



Scenario	3
Scenario	Aircraft operate in the 1 NM visual circuit pattern from North Coates Airfield (should this be applicable).
Hazardous Condition	Obstacles can be difficult to see from the air in certain meteorological conditions (low light levels). If the pilot has not spotted the obstacle, or is unaware of its existence, there is potential for an accident to occur.
Hazard	VFR/VMC traffic encounters man-made object within proximity to North Coates Airfield, whilst operating in the established visual circuit.
Hazard Probability	Frequent
Consequence	Near miss incident; last minute avoidance seriously degrades safety margins; potential for collision with object.
Severity	Major
Mitigation	Promulgation of temporary obstacle description, height and location in Airfield documentation and notices, should ensure that pilots are aware of the any potential obstacles and aid in the planning of obstacle avoidance; Notification of the installation works by North Coates Flying Club to local and visiting pilots.
Mitigating Failure Probability	Extremely Remote
Consequence Probability	Extremely Remote
Risk Class.	Acceptable
Notes	Traffic flying VFR/VMC are required to maintain adequate clearance of cloud and have adequate flight visibility; factors which contribute to lowering potential of actual collision. OLS as defined in CAP 168 are stipulated from licenced aerodromes but have been applied to the unlicensed runway at North Coates as a worse-case scenario.