ST HELENA AIRPORT PROJECT

Planning Statement: Request for Amendment to Development Permission for Airport Project Works in Prosperous Bay Plain

Realignment of Security Fence Near the Doppler VHF Omnidirectional Range (DVOR)

May 2016

Contents

Acronyms & Abbreviations

ADA	Airport Development Area
ADAO	Airport Development Areas Order
ES	Environmental Statement
PMU	Project Management Unit
SHG	St Helena Government

1. Background

Security Fencing at the St Helena Airport

Governor-in-Council granted development consent for the St Helena Airport Project and Supporting Infrastructure in September 2008.

Included in the original development consent was a security fence at Prosperous Bay Plain. The security fence marks the perimeter of the airport site, except where the airport is bordered by steep and inaccessible cliffs and no fencing is necessary. The security of the airport perimeter is an essential requirement in order for the St Helena Airport to comply with OTAR 178 (the Overseas Territories Aviation Requirement dealing with airport security).

The security fence fulfills a number of security and safety functions:

1. It will provide the separation between landside and airside at the Airport;
2. It will restrict access by unauthorised personnel to the airside environment;
3. It will restrict access by wildlife to the airside environment, thus reducing the risk of runway incursions that would impact on aircraft safety.

The DVOR

This Planning Statement relates only to the section of fencing that borders the Doppler Very High Frequency Omni-Directional Range (DVOR).

The DVOR is one of the essential navigational aids needed to operate St Helena Airport. It was originally located near Bradley's Camp but following the first calibration flight in September 2015, it transpired that this location was not workable. Following consultation with the SHG Planning Department the DVOR was relocated to the 1 in 7 batter near the Airport Buildings at Prosperous Bay Plain.

The Problem to be Addressed

The DVOR operates in the VHF band with a radio wavelength of between 2.7m- 2.5m (108-117.95 MHz). In radio propagation any metal element can be considered an effective reflector if it is less than 1/10 the operating wavelength.

Following the relocation of the DVOR to Prosperous Bay Plain, the existing metal fencing around the new DVOR position was identified as a significant risk causing reflections impacting on the DVOR performance.

As a result the current setup at Prosperous Bay Plain is in clear breach of the siting restrictions for the DVOR previously supplied by Thales and as set out in ICAO recommendations. The Airport Project Team has been advised that refusal to mitigate the known reflections will lead to reduced performance and a potential non-compliance with the requirements for airport operations (ref: Thales motivation, Appendix 1).

Analysis shows that the DVOR is sited in an optimum location at Prosperous Bay Plain: it is not proposed to relocate the DVOR. Instead, a solution to the issue of reflections from the fencing must be found.

2. Security Fencing near the DVOR: Reviewed Options

The Airport Project Team considered the following options to provide a solution to the need for fencing at the boundary of the airport bordering the DVOR, whilst reducing the risk of reflections from the fencing impacting on the performance of the DVOR.

Option 1 - Original position of the existing metal security fence
The existing metal fencing around the new DVOR position (1 in 7 batter) was identified as a significant risk causing reflections impacting on the DVOR performance. This option is not feasible.

Option 2 - Use of Glass Reinforced Plastic (GRP) mesh fencing
A potential option to use non-conductive, corrosion free Glass Reinforced Plastic (GRP) mesh fencing material on the original fence alignment was extensively considered and investigated. However, the effect of rainwater on the mesh fence could result in the fence becoming sufficiently conductive when wet, giving variable reflective performance and hence changing operational navigation performance in an unpredictable manner. This option is therefore not feasible.

Option 3 - Rerouting the existing metal security fenceline
The problems associated with reflections of various types of fencing considered can be very simply mitigated by routing the fenceline differently. If routed such that it is hidden behind the natural rising ground to the West, which is known to have no effect, then neither the safety nor operation of the DVOR, nor the Security characteristics of the fence are compromised. This is the preferred option.

3. Realignment of the Security Fence: the resulting design

Based on the three above reviewed options, Option 3 to realign the metal security fenceline is preferred.

Following site walkovers with engineering and environmental staff from the Airport Project team, a design has been developed to realign the security fence. The design takes into account the need to minimise reflections on the DVOR as well as to site the security fence as sensitively as possible within an area where there are environmental considerations.

The resulting design is shown on the attached map at Appendix 4. It is proposed that the security fence will be realigned behind the batter to avoid interference of the security fence with the DVOR.

This location falls outside the construction boundary identified in the original development consent for the Airport Project (2008) but is within the Airport Development Area Order (2008), i.e. it falls within land identified for the purposes of airport development.

The proposed design impacts a length of 341.548m of security fencing and an encompassing area of 9545.43m^2 (see the attached design).

4. Environmental Considerations

As shown in the attached design, the realigned metal security fenceline will border the Central Basin.

The St Helena Airport Project has supported a number of studies that have identified the environmental sensitivity associated with the Central Basin. Amongst other references, the Environmental Statement for the Airport Project (2008) refers and was a key part in the development of the design for the realigned fence.

The permanent impacts of the proposed design are minimal in total land take (± 340 m in length). The erection of the fence line will be carried out sensitively and under full watching brief of environmental personnel as detailed in the Method Statement in Appendix 3.

Considering the environmentally sensitivity of the area, the St Helena Airport Project therefore carried out two environmental surveys:

- Vascular plants and lichens on the proposed divert of the airport security fence around the DVOR site carried out by Mikko Paajanen, LEMP Ecologist (Appendix 5)
- St Helena Airport DVOR fence realignment – invertebrate survey carried out by St Helena National Trust (Appendix 6)

The only native vascular plant species identified in the affected area was the samphire (Suaeda fruticosa). This species is relatively common and widespread on the dry areas of St Helena. It was however noted the timing of the walk was during the dry season and as other native species are generally annuals they are not visible in the dry season.

It was recommended that to save the soil seed bank and biological soil crust in the area where the trench for the security fence is going to be dug, the first ~50 mm of the soil needs to be scraped to one side. This soil needs to be kept separate from other material coming from the ditch, and after the completion of works applied back on top of the disturbed area. In general, disturbance needs to be kept to a minimum in all the working areas.

The endemic lichen Dimelaena triseptata was observed on the proposed line of the fence. There is a variety of other lichens on rocks and soil crusts on the site.

It was recommended that the lichen covered rocks need to be salvaged where possible, especially if they host the endemic Dimelaena triseptata. The regeneration of soil crust will be easier if in the area where the trench for the security fence is going to be dug, the first ~50 mm of the surface soil is salvaged. This soil needs to be kept separate from other material coming from the ditch, and after the completion of works applied back on top of the disturbed area. In general, disturbance needs to be kept minimal in all the working areas.

The Invertebrate survey identified that the site holds a significant endemic invertebrate fauna. Of particular interest are two species of beetle found in dead organic matter, specifically Samphire (Suaeda fruticosa) and Ice plant (Mesembryanthemum crystallinum); these were both found immediately on, and adjacent to, the proposed fence realignment. The discovery of evidence of the Prosperous Bay Plain mole spider, albeit at low density, to the east of its previously known location is also of considerable importance. Other endemic species that are largely restricted to the Prosperous Bay Plain area are also present. By using species diversity assessment software it has been shown that numerous other taxa should also be present and, if the endemic to non-endemic ratio is the same as that for the species identified so far, approximately 50% of these will be endemic. As a result of this the utmost care should be taken to minimise disturbance to the site during the construction phase of the works.

This survey recommended that the fence be adjusted slightly to take into account the above, the rationale behind this is that the micro-habitat block containing the Samphire and Ice plant will remain relatively undisturbed, thus minimising potential fragmentation in an area containing significant invertebrate interest. This has been incorporated into the new realignment of the security fence.

The Environmental Advisors to the Airport Project within Basil Read, Halcrow and the Access Office therefore concur that the design for the realigned fenceline can be appropriately managed within this sensitive area.

5. Financial and Economic Considerations

Financial and economic impacts of the Airport Project were considered by Governor-in-Council as part of the original approval process for the Airport Project. No additional financial or economic considerations have been identified as a result of the revised design.

The security fence line provides essential infrastructure that is critical to ensure that the airport is secure and compliant with regulatory requirements.

6. Request for Development Consent

Development consent is sought from Governor-in-Council to amend the original development consent granted for the Airport Project to enable the realignment of the security fencing near the DVOR at Prosperous Bay Plain.

The security fencing is essential infrastructure to ensure the safety and security of the Airport: without this the St Helena Airport will not be compliant with regulatory requirements under OTARs (Overseas Territories Aviation Requirements).

Development consent is sought under Section 8 of the Airport Development Ordinance (2006). The Ordinance makes provision that anything done in a designated 'Airport

Development Area' with the consent of the Governor-in-Council is to be treated as done with development permission under the Land Planning and Development Control Ordinance.

Appendix 1:

APPENDIX 1

St Helena Doppler VHF Omnidirectional Radio Range (DVOR) – Security Perimeter Fencing Examination

Background. As part of the navigation aid fit for St Helena airport, the DVOR was re-located to a mid-position to the West of the runway. Locations available within the Airfield Development Area allocated by the Client were very limited. This was done to significantly improve the technical performance and the modelling studies done beforehand required a section of security perimeter fencing be removed.

The existing metal fencing was identified as a significant risk causing reflections impacting on the DVOR performance and a large section of it was removed. This document expands on these issues and is intended to propose appropriate mitigation to satisfy both airport security and aircraft safety.

Reflection Principles. The DVOR operates in the VHF band with a radio wavelength of between 2.7m > 2.5m (108-117.95 MHz). In radio propagation, any metal element can be considered an effective reflector if it is less than 1/10 the operating wavelength. A chain link metal fence with 50mm square openings embedded in good earth is to all intents 'RF opaque' and hence a very good reflector at VHF. The normal DVOR radiation is in all directions and at close range basically horizontal. Therefore having a metal fence close in reflects a significant of the radiated DVOR signal back towards the DVOR. As well as reducing the signal in the direction of the fence (intended direction) it will interfere with signals in the opposite direction causing corruption. For these reasons DVOR siting criteria deliberately lay down restrictions on metal structures near to navigation aids and DVOR in particular. (See EUROCAE ED52 DVOR Minimum Performance Standard - Fig 18)

As a result compromises must be implemented to maintain the currently certified performance of the DVOR and achieve physical perimeter security.

Groundplane effect. The DVOR antenna system is mounted on a metal groundplane which assists the radio performance. Unfortunately, this has had to be mounted at ground level for technical performance reasons (cutting out reflections off the sea). As well as introducing the reflection effect above, it also brings into play the natural ground level acting as an earthed groundplane. At the DVOR location there is an area of raised, sloping ground just behind the removed fence section which could act as a groundplane, but Flight checks have proven that the effect is minimal and operationally insignificant (with no nearby fencing).

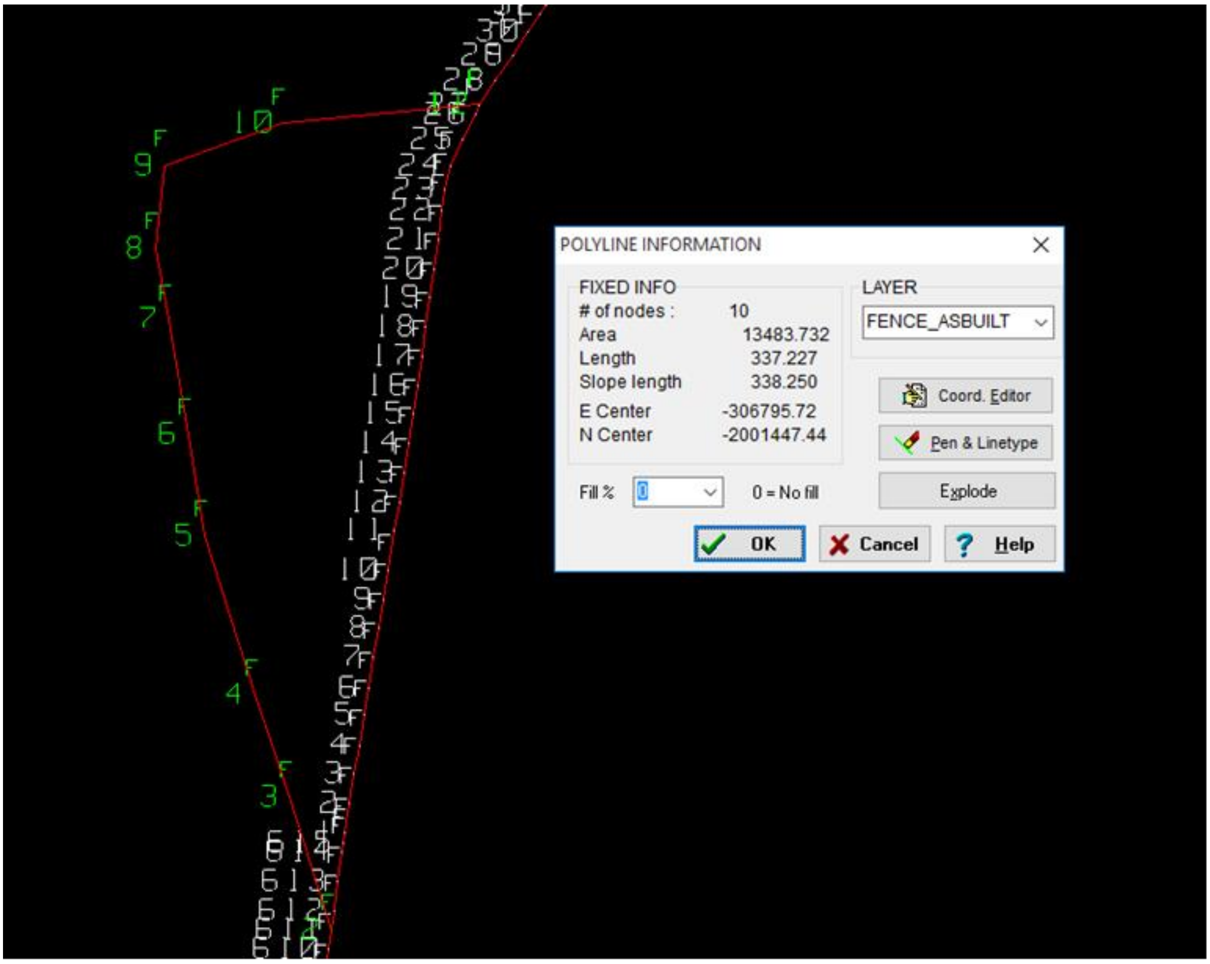
Fencing Types. As the key with reflection is a conductive material ie metal, this can be mitigated with the use of non-conductive materials such as glass reinforced plastic (GRP) or wood. From a security perspective, tools needed to breach either of these are similar to those needed for a metal fence, so the level of effort is almost identical.

Whist dry, both materials are effectively 'RF invisible' and non-reflective. However, the effects of water saturation need to be considered. In common with other materials, the conductivity – or more relevantly Resistivity of water varies depending on the saturation levels of contaminants and temperature. Pure distilled water has the highest resistivity (~18M Ohm/cm @ 25ºC) but even a few minutes of exposure to air reduces this significantly. At the other end of the scale grossly contaminated water can have values as low as 600 Ohm/cm. Also, early rainwater fall can exhibit different resistivity than rain from later in the same rain period. Attempts to calculate the theoretical net effect of all the series and parallel paths on a mesh fence would require massive computational power and multiple error inducing assumptions. Therefore theoretical calculation or modelling would be likely to yield unreliable and low value data.

Practical test scenarios are also severely affected by the multiple variables and difficult to implement. This would imply that the most suitable test would be a Flight Check of the actual DVOR signal. However, water induced effects cannot be practically fully assessed as the degrees of 'wet', with different resistivity values affect the outcome leading to no single clean test scenario achievable by a flight check aircraft. In addition to this, any non-conductive fence may become sufficiently conductive when wet to give variable reflective performance and hence change operational navigation performance in an unpredictable manner. Coupled with variable ground soil resistivity this would lead to the situation that the observed result was only valid for that single set of parameters extant during the flight check. In a Flight Safety arena, extrapolation of such data is unacceptable without solid theoretical or empirical evidence to support.

Simple Mitigation. The problems associated with reflections of various types of fencing, necessarily considered due to the fenceline proximity, can be very simply mitigated by routing the fenceline differently. If routed such that it is hidden behind the natural rising ground to the West, which is known to have no effect, then neither the Safety and Operation of the DVOR, nor the Security characteristics of the fence are compromised. This option also has the benefit that vehicular (and pedestrian) traffic could not park on top of that rising ground and introduce operationally damaging temporary reflections.

Appendix 2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	METHOD STATEMENT GENERAL SECURITY AND RESTRICTED ZONE SECURITY FENCE – DVOR SPECIFIC SHAP-BR-700-CI-MST-0002 SAINT HELENA AIRPORT PROJECT	Date: 09/03/2016 Rev: 0 PAGE 9 OF 18

METHOD STATEMENT

GENERAL SECURITY AND RESTRICTED ZONE SECURITY FENCE INSTALLATION – DVOR SPECIFIC

DOCUMENT INFORMATION

DOCUMENT CONTROL NUMBER

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Contract No	Organisation	Area Code	Discipline	Document Type	Unique Number	Revision

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Reviewed: BR Island Director Deon De Jager	Sign/Date: 09/03/16

Accepted: PMU Andreas Huber	Sign/Date: 10 March 2016

1. Purpose of Method Statement

This Method Statement describes the work associated with the installation of the restricted zone security fence (Type 2) in the vicinity of the DVOR, outside of the ADA and within the upper eastern part of the Central Basin.

2. SITE LOCATION

Restricted zone security fencing (Type 2):

- Airport precinct along boundary separating airside & landside and airside restricted zone security fence.

3. WORK PROGRAMME

As soon as approval is obtained

4. Drawings

This method statement is applicable to the following drawings:

- WPG-700-CI-0021-01 Rev C – Restricted zone security fence details (Type 2).
- WPG-700-CI-0021-02 Rev B – General security fence detail (Type 1).
- WPG-700-CI-0005-01 Rev F – Security fencing and access roads layout.
- VCE-710-ST-0004 – DVOR.

Specific Drawings

- **DWG.DVOR F01 Rev01**
- **DWG.DVOR F-01**

5. Scope of Works

The scope of works includes the following:

- Setting out – Surveyor.
- Preparation of alignment for fence line.
- Installation of fence posts.
- Installation of fence.

6. Materials

- Fencing material, posts, stays and mesh
- Concrete for posts.

7. Plant and Labour

The plant and labour required to execute the works includes, but is not limited to the following:

- Concrete truck, limited to drive only on airfield roads and tracks.
- Compressor and accessories
- Labour: All required plant operators (Approximately 7no.) and general labour (Approximately 10no). Foreman, etc.

8. SEQUENCE OF WORKS

Access to the area will be limited to labour only in order to reduce the footprint outside of the current ADA. A 3m wide working area will be required on the Airside of the new fence alignment and all movements will be restricted to this footprint. This track will remain in place for future maintenance and inspections of the fence line.
Should a compressor and breakers be required to remove hard rock, compressor will be stationed close to existing ADA boundary and only hoses and breakers taken to the area of work.

This MS is applicable for the realignment of the fence between co-ordinates NF1 to NF6.

- Surveyor to set out alignment for fencing
- Site Walkover with Interested and Affected Parties to identify mitigations / relocation of endemics.
- Implementation of Walk Over findings
- Fence will follow natural contours in order to minimize the construction footprint.
- Excavate for corner posts and stays (posts used for horizontal direction changes ± 90 degrees.) (Applicable to type 2 fencing.), install posts, align and cast concrete. Concrete to be carried to point of pour in buckets and or wheelbarrows using labour.
- Excavate for straining posts and stays (posts used for straining wires with little or no horizontal direction changes.) (Applicable to type 2 fencing), install posts, align and cast concrete. Concrete to be carried to point of pour in buckets and or wheelbarrows using labour.
- Excavate for intermediate posts (posts at ± 3m intervals to keep fence vertical.) (Applicable to type 2 fencing), install posts, align and cast concrete. Concrete to be carried to point of pour in buckets and or wheelbarrows using labour.
- Excavating fence post holes – there are a few methods to create holes to secure the different fence posts needed depending on hardness of material:
    - Dig holes by hand.

- When required in certain areas holes would be dug by making use of compressor and breakers.

- Excavate a 300mm deep trench at ±0.5m from outside edge of levelled off area. (Applicable only for type 2 fencing).This is necessary as the type 2 fence needs to be buried to a depth of 300mm. This would be done at the same time when excavating for the posts/ stays. Areas where the ground is solid rock, the fence would be trimmed and the base of the fence be nailed to the ground using chemical anchors, or alternatively a concrete sill could be cast to secure the fixing of the fence to the ground. The ± 2.5m left over from the fence to edge of levelled area would be used to transport material to the work area. This pathway can be used for future maintenance and inspection.
- Install fence as per drawings and fence supplier's specifications.

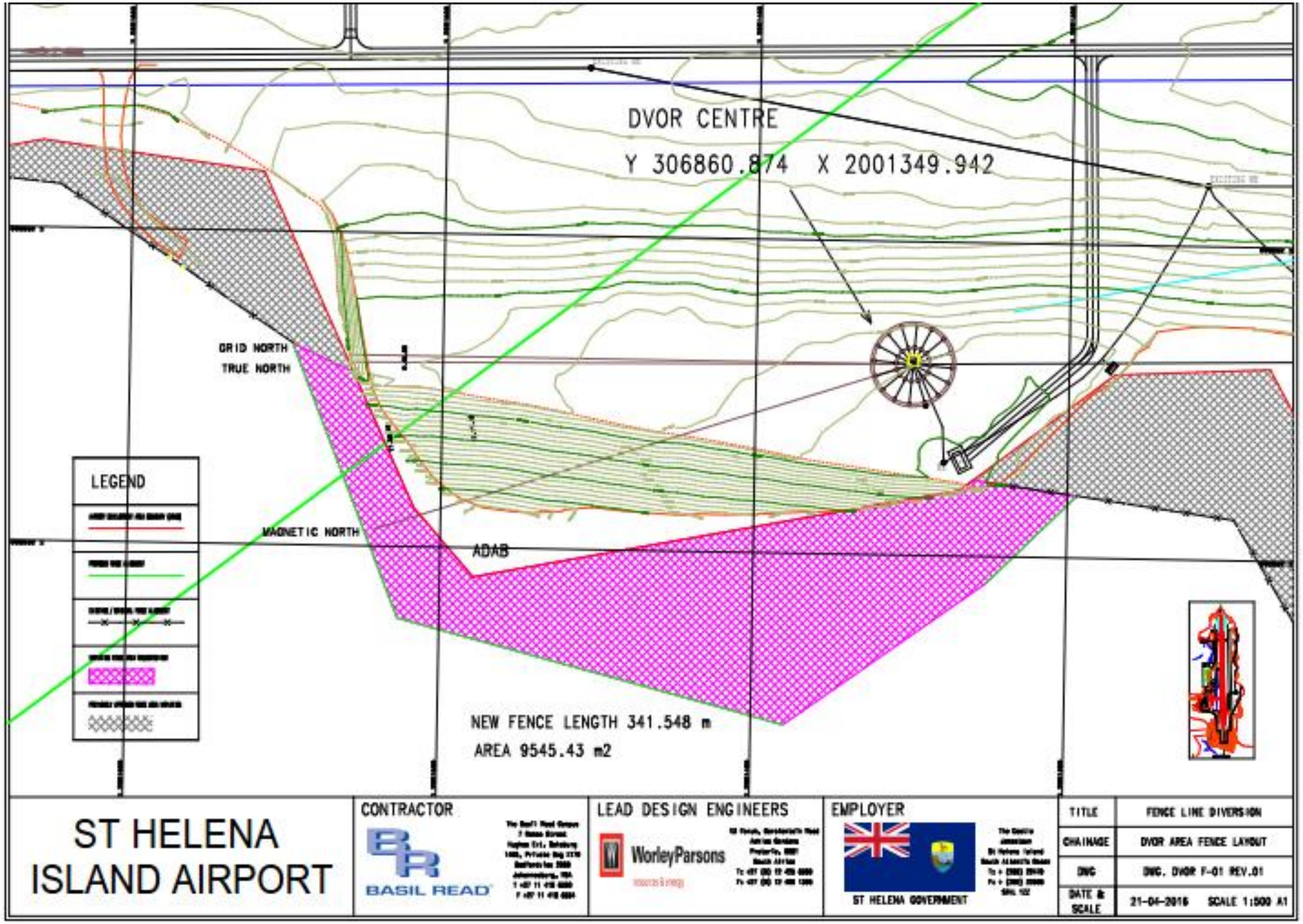
9. Safety

All work to be executed in terms of existing fencing safety risk assessment.

10. Environmental

All work shall be conducted in accordance with CEMP and consideration to waste management shall be conducted accordingly.
However, the following mitigation measures need to be implemented that are specifically related to the installation of security fencing:

- When accessing the area as indicated on the drawings, access will be limited to people only and due care should be taken to limit access within a 3m footprint.
- All staff working on the installation of the fence need to be made aware of the environmental sensitivities of the area via toolbox talks- communicating walkover notes to personnel.
- Environmental supervision needs to be present in areas that are particularly environmentally sensitive e.g. presence of wirebirds, rare lichen and native flora.
- Access track to reside on the inside of the fence line (where feasible) to limit footprint and disturbance as far as practically possible.
- Personnel to be made aware of the presence of rare and/or endemic plant lichen populations.
- Strict control on waste to be implemented, strictly forbid littering by providing waste bags.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Vascular plants and lichens on the proposed divert of the airport security fence around the DVOR site

Based on a site walkover conducted 15th March 2015.
Mikko Paajanen, LEMP Ecologist, 29th March 2016.

Vascular plants

The only native vascular plant species identified was the samphire (*Suaeda fruticosa*). This species is relatively common and widespread on the dry areas of St Helena. It is ecologically important, providing ground cover, and habitat for several endemic invertebrate species. Samphire tolerates disturbance well and the proposed works should not have a negative effect on this species.

It is noted that the timing of the walkover during the dry season is not optimal for surveying the endemic vascular plant species in the Prosperous Bay Plain area, as the species that can be expected are generally annuals and usually not visible in the dry season.

Endemic, native and probably native species that *could potentially* be present on the site, as they are either present in adjacent areas, or the wider Prosperous Bay Plane and Dry Gut area include:

Babies' toes	*Hydrodea cryptantha*	Endemic
Bayonet grass	*Tribolium obliterum*	Native
Boneseed	*Osteospermum sanctae-helenae*	Endemic
Candlestick amaranth	*Amaranthus thunbergii*	Probably native
Fish-bone grass	*Eragrostis cilianensis*	Probably native
Neglected tuft sedge	*Bulbostylis neglecta*	Endemic
Pagoda plant	*Cotula coronopifolia*	Probably native
Purslane	*Portulaca oleracea*	Native
Samphire*	*Suaeda fruticosa*	Native
St Helena goosefoot	*Chenopodium helenense*	Endemic

*Samphire is present on the site

As a precautionary principle these species need to be taken into consideration. The desert annuals are likely to have a soil seed bank that can easily be saved while doing the works. This makes it possible for the desert annuals to regenerate from the soil seed bank and also act as an inoculant for the biological soil crust organisms. Biological soil crusts have an important function in the ecology of the desert ecosystems, reducing both wind and water related erosion.

Recommendation

To save the soil seed bank and biological soil crust in the area where the trench for the security fence is going to be dug, the first ~50 mm of the soil needs to be scraped to one side. This soil needs to be kept separate from other material coming from the ditch, and after the completion of works applied back on top of the disturbed area. In general, disturbance needs to be kept minimal in all the working areas.

Lichens and the biological soil crust

The endemic lichen *Dimelaena triseptata* was observed on the proposed line of the fence. There is a variety of other lichens on rocks and soil crusts on the site.

Recommendation

The lichen covered rocks need to be salvaged where possible, especially if they host the endemic Dimelaena triseptata*. The regeneration of soil crust will be easier if in the area where the trench for the security fence is going to be dug, the first ~50 mm of the surface soil is salvaged. This soil needs to be kept separate from other material coming from the ditch, and after the completion of works applied back on top of the disturbed area. In general, disturbance needs to be kept minimal in all the working areas.*

Appendix 6 – Attached Separately