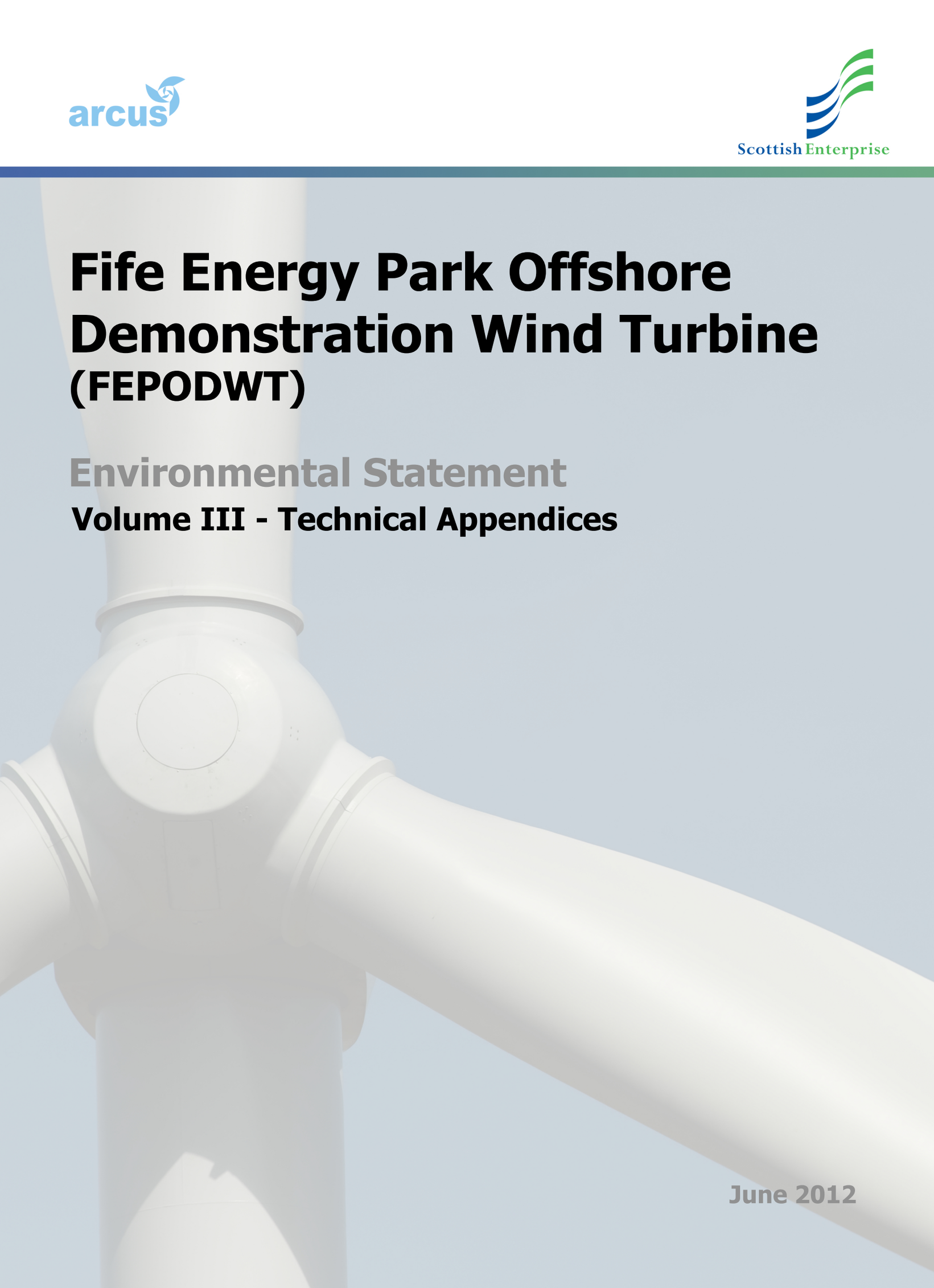
Fife Energy Park Offshore Demonstration Wind Turbine (FEPODWT)

Environmental Statement

Volume III - Technical Appendices



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Technical Appendix 5.1	Viewpoint Analysis
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Appendix 5.1 - Viewpoint Analysis

5 TECHNICAL APPENDIX 5.1: VIEWPOINT ANALYSIS

5.1 Introduction

A total of 24 viewpoints have been included in the assessment and these mostly correspond with viewpoints chosen for the Consented Development in order that direct comparisons can be made between both schemes. Three additional viewpoints have, however, been included along the southern shore of the Firth of Forth at the request of Scottish Natural Heritage and other consultees to illustrate the potential effects of the Development on more distant views beyond the study area. The viewpoints included in the assessment are listed in Table 5.5 of the Environmental Statement (Volume I) and are identified on Figure 5.3 of the Environmental Statement (Volume II). Visualisations by way of photographs, wirelines and, in some cases, photomontages have also been prepared for each viewpoint to illustrate the Development in conjunction with views that are currently obtained. These visualisations are shown on Figures 5.15a to 5.15x of the Environmental Statement (Volume II). A further set of wirelines have been prepared to show the Development in conjunction with other wind energy developments from some of these viewpoints and these are shown on Figures 5.16a to 5.16k.

The photographs, wirelines and photomontages shown for each viewpoint on Figures 5.15a to 5.15x cover a 75^{o} horizontal field of view, which reflects the widest field of vision that can be obtained by a static person without moving their head. This is important as it allows the Development to be seen in context with the surrounding view. When reproduced at A3 size, as is the case with this assessment, the 75^{o} degree photographs, wirelines and photomontages should be viewed at a distance of approximately 300 mm in order to gain as accurate an impression as possible of the effects of the Development on the existing views. Additional wirelines prepared to show the Development in conjunction with other wind energy developments, as shown on Figures 5.16a to 5.16k, cover a 180^{o} horizontal field of view, which reflects the widest field of vision that can be obtained by a static person by turning their head. For some of these figures, two 180^{o} wirelines are included to represent a full 360^{o} view around the viewpoint. These additional wirelines should also be viewed at a distance of approximately 300 mm.

It should be noted that the viewpoint assessment has not identified any differences between the Development and the Consented Development in terms of sensitivity, magnitude and overall significance for each of the viewpoints assessed.

5.2 Viewpoint 1: B931/Fife Coastal Path, Buckhaven

Grid reference: E336546 N698829
Approximate distance to the development: 500 m
Approximate elevation: 20 m AOD
Receptor type: Residents/Walkers
Landscape character type: Urban edge with coast
Landscape designation: None
Figure 5.15a

Baseline view: Viewpoint 1 is the closest viewpoint to the Development, lying on Fife Coastal Path where it follows the B931 through Buckhaven immediately adjacent to the western boundary of Fife Energy Park (FEP) where the Development is located. The view clearly shows the semi-derelict and industrial character of the FEP site, which includes a large-scale steel fabrication plant, just to the left of the view out of shot, and several tall lighting masts. These introduce large-scale, vertical elements into views from adjacent housing and from the coastal footpath where views are available. Beyond the FEP site, expansive views are obtained across the Firth of Forth and it is just possible to define the southern shoreline and more distant hills behind silhouetted on the skyline, although any detail is largely indistinguishable.

The viewpoint has been included to illustrate the effect that the Development will have on available views from residential properties that face on to the FEP site, principally along the B931 Wellesley Road. It also represents views from Fife Coastal Path at a point where it passes closest to the Development.

Sensitivity: Occupiers of residential properties and users of long distance footpaths are normally considered to have a high sensitivity to development. However, the current outlook for occupiers that adjoin the FEP site and users of the coastal path is one of semi-derelict land, with views dominated by large-scale industrial buildings and other vertical elements. These combine to lower sensitivity and thus sensitivity of the viewpoint to the Development is judged to be *medium.*

Magnitude of effect: The magnitude of effect on this view as indicated by the ZTV, wireline and photomontage is judged to be *very large,* with the Development providing the dominating influence in the view despite the presence of other large-scale detracting elements. This is due to the close proximity of the Development, the width of view affected, the high visibility of the Development and the contrast that its scale, vertical form and movement will have on the baseline view.

It should be noted, however, that the broad, open and predominantly horizontal nature of the coastal setting in which the Development will be seen provides an appropriate receiving environment by limiting uncomfortable scale comparisons that can arise when turbines are located in smaller, more intimate and varied landscapes. The presence of large-scale industrial buildings and masts in the view also provides a logical setting for the Development as well as providing other foreground distractions, which limits the eye catching impact that the Development would otherwise have. While these factors reduce sensitivity, the magnitude of effect will still be classified as very large due to the change in the view that will result from the introduction of the Development.

The Development will be the principal visible element of the built scheme and the operations building may also be visible, however, in the context of the existing view this will not be significant. Cranes will also be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be *moderate-major* and will be significant. The Development will have a material effect on the outlook that causes the baseline characteristics of the view to be redefined by its presence. This is due to the combination of factors that results in a very large magnitude of effect, irrespective of the sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: None

5.3 Viewpoint 2: Shore Street, Buckhaven

Grid reference: E335933 N697836
Approximate distance to the development: 900 m
Approximate elevation: 5 m AOD
Receptor type: Residents/Recreational Users
Landscape character type: Urban edge with coast
Landscape designation: None
Figure: 5.15b

Baseline view: Viewpoint 2 lies on the southern-most tip of Buckhaven, immediately below the FEP site, where views are less influenced by the general industrial character that typifies the coastal edge of the town and neighbouring Methil. Although lighting masts are clearly visible on the FEP site, the outlook is generally one of an open and expansive nature across the Firth of Forth as far as distant hills that define the southern shore, to the right of the view out of shot. The viewpoint has been selected to represent views available from some houses on the coastal edge of the town where industrial influences are less prevalent. The viewpoint is also representative of views gained by users of a linear public open space along the sea front.

Sensitivity: Unlike the previous view this viewpoint has a *high* sensitivity due to the more scenic qualities represented in the coastal outlook, as well as the representation of residential occupiers and recreational users.

Magnitude of effect: The magnitude of effect on this view as indicated by the ZTV, wireline and photomontage is judged to be *very large*, with the Development being immediately apparent and providing the dominant influence in the view, despite the more oblique angle of visibility. This is due to the close proximity of the Development, the width of view affected, the high visibility of the Development and the contrast that its scale, vertical form and movement will have on the baseline view.

As with viewpoint 1, it should be noted that the broad, open and horizontal nature of the coastal setting in which the Development will be seen provides an appropriate receiving environment by limiting uncomfortable scale comparisons that can arise when turbines are located in smaller, more intimate and varied landscapes. The magnitude of effect will, however, remain very large.

The Development will be the only visible element of the built scheme, with intervening earthworks screening all other site infrastructure. Cranes will also be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be *major* and will be significant. The Development will have a material effect on the outlook that causes the baseline characteristics of the view to be redefined by its presence. This is primarily due to the combination of factors that results in a very large magnitude of effect, although the high sensitivity of the viewpoint reinforces the effect.

Variances of Consented Scheme and Revised Scheme: None

5.4 Viewpoint 3: A955, Buckhaven

Grid reference: E335901 N699281
Approximate distance to the development: 1.3 km
Approximate elevation: 25 m AOD
Receptor type: Residents/School/Road Users
Landscape character type: Urban edge with Coastal Hills
Landscape designation: None
Figure: 5.15c

Baseline view: Viewpoint 3 is at the entrance to Buckhaven High School and has been selected to represent close views available from some houses that lie immediately north of the Development within Buckhaven and neighbouring Methil, as well as from the school. The built-up nature of the area north of the Development has a considerable limiting effect on visibility and this viewpoint affords a rare view towards it from slightly elevated ground. Industrial buildings and lighting masts on the FEP site are clearly visible above the roof lines of intervening houses, as is Methil Docks turbine to the far left of the view. The Firth of Forth can just be seen stretching away into the distance.

Sensitivity: The viewpoint has a *high* sensitivity, due largely to its representation of residential occupiers. Users of the school will also gain views although they will be more focussed on their school activities and are less sensitive. Some views will also be obtained for users of the A955.

Magnitude of effect: The magnitude of effect on this view as indicated by the ZTV, wireline and photomontage is judged to be between *large* and *very large*, with the Development being immediately apparent and providing the predominant influence in the view. This slight reduction in magnitude compared with the previous two viewpoints is due primarily to increased distance, which reduces the perceived scale and vertical influence of the Development. The presence of built development in the foreground also helps to screen the lower part of the Development, which in turn reduces the vertical impact that it might otherwise have when seen at full height. Despite these factors, the relatively high visibility of the Development and the contrast that its scale, vertical form and movement will have on the baseline view is such that it will remain the predominant influence in the view.

The Development will be the only visible element of the built scheme, with intervening buildings screening all other site infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be between *moderate-major* and *major* and will be significant. The Development will have a material effect on the outlook that causes the baseline characteristics of the view to be redefined by its presence. This is primarily due to the combination of factors that results in a large to very large magnitude of effect on a viewpoint of high sensitivity.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

5.5 Viewpoint 4: Fife Coastal Path, East Wemyss

Grid reference: E334387 N697192
Approximate distance to the development: 2.5 km
Approximate elevation: 30 m AOD
Receptor type: Walkers/Residents
Landscape character type: Coastal Hills
Landscape designation: None
Figure: 5.15d

Baseline view: Viewpoint 4 is located on Fife Coastal Path where it follows the perimeter of East Wemyss cemetery to Macduff's castle ruin. It has been included to represent slightly more distant views from the long distance footpath where it follows a more rural route south-west of the Development. The viewpoint also represents views from some houses on the eastern edge of the settlement.

The view clearly shows the general character of the *Coastal Hills* landscape type in the foreground, through which the footpath passes following a tree lined route between two ploughed fields. In the middle distance the built-up edge of Buckhaven is a noticeable component of the view as are lighting masts on the FEP site, which provide a useful reference point for the Development. Methil Docks turbine is also discernible just to the left of the FEP site and below a backdrop of more distant hills. Further to the right, in the vicinity of the ruined castle, expansive views are obtained across the Firth of Forth and it is just possible to make out the chimney stacks and steam plumes from the power station at Cockenzie on the southern shore.

Sensitivity: This viewpoint has a *high* sensitivity due largely to its location on the long distance and sign posted footpath, as well as its representation of views for some residents. People using the route will have an awareness of their surroundings and will be focussed on the landscape through which they are slowly passing. There are also some scenic qualities in the coastal landscape seen in the view.

Magnitude of effect: The magnitude of effect on this view as indicated by the ZTV, wireline and photomontage is judged to be *large,* with the Development being immediately apparent and providing the prevailing influence in the view. The slight reduction in magnitude from very large to large is due primarily to increased distance, which reduces the perceived scale and vertical influence of the Development in the view. The presence of foreground trees also has some beneficial scale comparison, as the trees lie closer to the viewer so reducing the perceived scale of the Turbine. Intervening built development and landform also ensures that visibility will be restricted to the upper parts of the Development, which in turn helps to limit the vertical impact. Nevertheless, the contrast in scale, vertical form and movement arising from the introduction of the Development will be immediately apparent and will provide the defining influence in the view.

As with viewpoints 1 and 2, it should be noted that the relatively broad, open and horizontal nature of the coastal setting in which the Development will be seen provides an appropriate receiving environment by limiting uncomfortable scale comparisons that can arise when turbines are located in smaller, more intimate and varied landscapes. The magnitude of effect will, however, remain large.

The Development will be the only visible element of the built scheme, with intervening landform and built development screening all other site infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be *moderate-major* and will be significant, with the Development having a material effect on the outlook that causes the baseline characteristics of the view to be redefined by its presence. This is due primarily to the combination of factors that results in a large magnitude of effect, although the high sensitivity of the viewpoint reinforces the significance of the effect.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

5.6 Viewpoint 5: Fife Coastal Path, Leven

Grid reference: E338521 N700655
Approximate distance to the turbine: 3.0 km
Approximate elevation: 10 m AOD
Receptor type: Walkers/Recreational Users
Landscape character type: Urban edge with Intertidal Shores
Landscape designation: None
Figure: 5.15e

Baseline view: Viewpoint 5 is located on Fife Coastal Path where it follows the promenade at Leven. It has been included to represent close views from the long distance footpath and adjacent beach north-east of the Development, at a point where urban and heavy industrial uses exert a significant influence on views in the direction of the FEP site. In the immediate foreground, Methil Docks Turbine is a conspicuous feature of the view and it is also possible to see large-scale industrial buildings and lighting masts on the FEP site in the same arc of view, albeit more distant. To the right of the view, out of shot, residential properties along the sea front are orientated towards the coast and for the most part have no direct visibility towards the FEP site and the Development. Further to the left, also out of shot, the view extends across the Firth of Forth and it is just possible to distinguish the southern shoreline and line of hills behind silhouetted on the skyline.

Sensitivity: As with viewpoint 1, this viewpoint has a *medium* sensitivity. This is because although users of the right of way and beach have a high sensitivity due to a greater awareness of their surroundings, the proximity and position of Methil Docks Turbine and other large-scale industrial influences relative to the Development lowers sensitivity.

Magnitude of effect: The magnitude of effect on this view as indicated by the ZTV, wireline and photomontage is judged to be *medium,* with the Development being a readily apparent feature in the view but with the baseline characteristics continuing to prevail.

There are a number of factors that limit the magnitude of effect to medium. The presence of Methil Docks Turbine in the foreground is particularly important as it introduces a certain familiarity to large-scale industrial structures, which has a moderating effect on views. The Turbine also provides a beneficial scale comparison as it lies closer to the viewer so reducing the perceived scale of the Development and the eye catching impact that it might otherwise have if it were the only or predominant vertical element in the view. Additionally, the broad, open and horizontal coastal setting in which the Development will be seen provides an

appropriate receiving environment by limiting uncomfortable scale comparisons that can arise when turbines are located in smaller, more intimate and varied landscapes.

The Development will be the only visible element of the built scheme, with intervening buildings screening all other infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be *minor-moderate* and will be not significant. The Development will have some effect on the view but this will not amount to a material change and it will not become the defining influence in the view. This is due to a combination of factors that restricts the magnitude of effect and also lowers the sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

5.7 Viewpoint 6: Kennoway

Grid reference: E335618 N701941
Approximate distance to the development: 3.8 km
Approximate elevation: 55 m AOD
Receptor type: Residents
Landscape character type: Urban edge with Lowland Dens
Landscape designation: None
Figure: 5.15f and 5.16a

Baseline view: Refer to Figure 5.15f. The settlement of Kennoway lies directly north of the FEP site where it occupies south facing slopes that rise up to a low east-west orientated ridgeline. This landform ensures that many houses gain long views towards the coast and where they are orientated towards the FEP site they will gain views of the Development. The viewpoint is located on Castle Terrace, which defines the southern built-edge of the settlement and is representative of views gained from the houses there.

The view is generally open, expansive and reasonably attractive with arable fields and trees in the immediate foreground extending to the built-up edge of Leven and Methil in the middle distance. Warehousing is a noticeable feature of the built-up edge, whilst built development generally occupies middle distance views as far as the coast and more distant southern shoreline beyond. The steel fabrication plant and lighting masts on the FEP site are conspicuous features on the skyline and help to locate the Development. To the far left of the view, Methil Docks Turbine is also a noticeable feature of the outlook.

Sensitivity: The viewpoint has a *high* sensitivity due to its representation of residential properties even though there are a number of detracting features in the view.

Magnitude of effect: Refer to Figure 5.15f. The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be between *medium and large,* with the Development being immediately apparent and providing one of the defining influences in the view along with the influence of the baseline characteristics. This is due to a combination of factors.

Factors that reduce the magnitude of effect include the broad, open and relatively uniform nature of the view which provides an appropriate receiving environment for the Development by limiting uncomfortable scale comparisons. The single turbine will occupy a small proportion of the view and this is also important as it will leave large parts of the baseline view unaffected. The presence of large-scale and vertical elements in the view, including Methil Docks Turbine, further helps to reduce the eye-catching impact that would otherwise be the case if the Development were seen in isolation. Intervening built development also ensures that the Development will not be seen at full height. The viewpoint is also over 3.5

km from the Development, at which distance the Development does not constitute the predominant component in the view, although it will be readily apparent.

While these factors limit the magnitude of effect, there are other factors that will increase it. The distance of the viewpoint from the Development ensures that it will be seen in some detail, with movement providing a contrast with the visual setting. Furthermore, the view is a direct outlook from the houses that occupy an elevated position.

The Development will be the only visible element of the built scheme, with intervening vegetation and built development screening all other infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be between *moderate* and *moderate major* and will be significant, with the Development having a material effect on the view that redefines the baseline characteristics. This is due to a combination of factors that results in a medium to large magnitude of effect on a viewpoint of high sensitivity.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16a. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *medium,* with the addition of the Development providing a noticeable role in extending windfarm influence in the view.

The wireline indicates that Little Raith (19 km from the viewpoint), Methil Docks Turbine (3 km from the viewpoint) and the 2-B Energy Proposed Development (5 km from the viewpoint) are theoretically visible in successive views, together with the Development. In reality, distance, together with intervening vegetation, is such that Little Raith (9 x 100 m turbines) will either be screened or will have, at best, a very limited influence. Thus, potential for cumulative effects on the view lies chiefly between the Development added to the operational turbine (1 x 81 m) at Methil Docks. The two turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also visible, however, they are at a scoping stage with greater uncertainty over their future.

The principal factor which reduces the cumulative magnitude of effect is the small number of turbines visible in the view, in this case four. From this viewpoint, all four turbines are seen in the same arc of view where they occupy a relatively small proportion of the available outlook. This is important as it means that much of the baseline view will remain unaffected. The general built-up nature of the view, including the presence of other vertical influences, is also important as it reduces the eye catching impact that these turbines might have if they were the only vertical influences in the view. Intervening buildings also ensures that these turbines are not seen at full height.

Whilst these factors limit the magnitude of effect, there are other factors that will increase it. The distance separating Methil Docks Turbine from the Development (approximately 2 km apart) is such that they will tend to read a separate developments rather than part of a slightly larger group. The viewpoint is also just over 3.5 km from both turbines, at which distance the disparity that exists between them (and the 2-B turbines) in terms of height and blade configuration is quite evident and reinforces the impression of two quite separate developments. The Development will also be the more prominent development in the view due to its greater height and proximity to the viewpoint.

Significance of cumulative effect: The cumulative effect on this view is judged to be *moderate* and will be significant. The addition of the Development to the Methil Docks Turbine will have a noticeable effect in extending windfarm influence in the view, with the prevailing characteristics of the view being redefined by the addition of the Development. This is due to a combination of factors that results in a medium cumulative magnitude of effect on a receptor of high sensitivity. Should the 2-B Energy Proposed Development also be

consented then windfarm influence will only marginally increase as the number, size and position of these turbines relative to the Development ensures that both schemes will tend to read as a single grouping of turbines in this view.

5.8 Viewpoint 7: Fife Coastal Path, Wemyss Castle

Grid reference: E332945 N695079
Approximate distance to the development: 5.0 km
Approximate elevation: 5 m AOD
Receptor type: Walkers/Recreational Users
Landscape character type: Coastal Hills with Intertidal Shores
Landscape designation: Edge of Wemyss LLA/Inventory site
Figure: 5.15g and 5.16b

Baseline view: Refer to Figure 5.15g. Viewpoint 7 lies on Fife Coastal Path directly below Wemyss Castle. It has been included to represent more distant views from the long distance footpath and adjacent beach south-west of the Development, at a point where the path adjoins the coastal edge of Wemyss Local landscape Area (LLA) and Wemyss Inventory site.

The view shows the particular character of the *Coastal Hills* landscape type where it meets the coast, in particular the wooded nature of the slopes that have a limiting effect on visibility from within the LLA and Inventory site. In the distance, the built-up edge of Buckhaven is just visible on the coastal hilltops as are lighting masts on the FEP site, but neither are particularly intrusive features of the wider outlook. Methil Docks Turbine is also apparent in the same arc of view with movement detectable. Further to the right, out of shot, expansive views are obtained across the Firth of Forth to the southern shoreline and it is just possible to see the chimneys and steam plumes from the power station at Cockenzie with more distant hills silhouetted behind.

Sensitivity: This viewpoint has a *high* sensitivity due to its location on the long distance footpath and representation of effects on the LLA/Inventory site and beach. There are also scenic qualities in the coastal landscape seen in the view.

Magnitude of effect: Refer to Figure 5.15g. The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to between *medium* and *large,* with the Development being immediately apparent and providing one of the defining influences in the view along with the influence of the baseline characteristics.

The principal factor that reduces the magnitude of effect from large is the open, uniform and expansive nature of the coastal view in which the Development will be seen, which provides an appropriate receiving environment by limiting uncomfortable scale comparisons. The single turbine will also occupy a small proportion of the wider view leaving large parts of the baseline view unaffected. The viewpoint is also 5.0 km from the Development, at which distance the Turbine does not constitute the predominant component in the view, although it will be readily apparent.

While these factors limit the magnitude of effect, there are other factors that will increase it. The distance of the viewpoint from the Development ensures that it will be seen in some detail, with movement providing a contrast with the visual setting. Furthermore, the orientation of the view for users of the footpath heading north-east is directly towards the Development from an open outlook.

The Development will be the only visible element of the built scheme, with intervening landform screening all other infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be between *moderate* and *moderate-major* and will be significant. The Development will have a material effect on the outlook that causes the baseline characteristics of the view to be redefined by its presence. This is due to the combination of factors that results in a medium to large magnitude of effect on a viewpoint of high sensitivity.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16b. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *small,* with the addition of the Development providing a small role in extending windfarm influence in the view.

This is partly due to the small number of turbines visible in the view, in this case the Development in conjunction with the operational turbine (1 x 81 m) at Methil Docks (7 km from the viewpoint). Although the turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also visible in the view (4.5 km from the viewpoint), they are still at a scoping stage with greater uncertainty over their future.

From this viewpoint, all four turbines are seen simultaneously in a particularly narrow arc of view where they occupy a very small proportion of the full available outlook. This is important as it ensures that much of the baseline view remains unaffected. The close proximity of the turbines is also important as it ensures that they appear as part of a slightly larger development rather than distinctly separate schemes. The disparity that exists between Methil Docks Turbine and the Development in terms of height and blade movement will be less apparent from this viewpoint as the Methil Docks turbine is only visible from hub-height behind the Development (and the 2-B turbines), which will naturally appear to be taller due to their closer proximity to the viewpoint.

Significance of cumulative effect: The cumulative effect on this view is judged to be *minor-moderate* and will be not significant. The addition of the Development to the Methil Docks Turbine will have a small effect in extending windfarm influence in the view, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to a combination of factors that results in a small cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only slightly.

5.9 Viewpoint 8: Local Road West of Kennoway

Grid reference: E333214 N702644
Approximate distance to the development: 5.5 km
Approximate elevation: 100 m AOD
Receptor type: Road Users
Landscape character type: Lowland River Basins
Landscape designation: None
Figure: 5.15h

Baseline view: Viewpoint 8 is located on the local road between Markinch and Kennoway. The view extends across the gently undulating and intensively farmed *Lowland River Basins* landscape type, which occupies the whole of the view. The Firth of Forth is visible as a narrow strip directly below the horizon and Methil Docks Turbine is just detectable to the far left of the view. Power lines in the foreground are a noticeable and detracting influence on the outlook.

The viewpoint has been included in the assessment as it makes a suitable representation of effects on local visual amenity north of the FEP site from relatively close by. Visibility of the Development from this road and other local roads further to the north and west is quite limited and so this view represents a rare glimpse towards it.

Sensitivity: This viewpoint has some sensitivity due to the rural nature of the view. However, the area is not covered by any landscape-related designations and it is not representative of residential views. The presence of detracting features also lowers sensitivity. As such, sensitivity of the viewpoint to the Development is judged to be *medium.*

Magnitude of effect: The magnitude of effect on this view as indicated by the ZTV, wireline and photomontage is judged to be *medium,* with the Development forming a readily apparent feature in the view but with the baseline characteristics continuing to prevail.

There are a number of factors that limits the magnitude of effect to medium. Firstly, the open and relatively uniform nature of the outlook provides an appropriate receiving environment by limiting uncomfortable scale comparisons. Secondly, the Development will only occupy a limited proportion of the full available view leaving the remainder of the outlook unaffected. The slightly elevated nature of the intervening landform also ensures that the Development will not be seen at full height, which further helps to limit its vertical influence. Thirdly, the presence of pylons in the view provides a beneficial scale comparison with the Development as they lie closer to the viewer and reduce the perceived scale of the Turbine, ensuring that it appears relatively small in comparison with its visual setting. The pylons also provide vertical elements on the skyline and thus the eye-catching impact that the Development might have if it was the only or predominant vertical element in the view is avoided. Finally, the viewpoint is approximately 5.5 km from the Development, at which distance the Turbine does not constitute the predominant component in the view, although it will be readily apparent.

The Development will be the only visible element of the built scheme, with intervening landform screening all other infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of Effect: The effect on this view is judged to be *minor-moderate* and will be not significant. The Development will have some effect on the view but this will not amount to a material change and it will not become the defining influence in the view. This is due to a combination of factors that results in a medium magnitude of effect on a viewpoint of medium sensitivity.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

5.10 Viewpoint 9: Fife Coastal Path, Lower Largo

Grid reference: E340759 N702543
Approximate distance to the development: 5.8 km
Approximate elevation: 15 m AOD
Receptor type: Walkers/Residents/Golf Course Users
Landscape character type: Lowland Dens with Intertidal Shores
Landscape designation: None, but Lower Largo is a Conservation Area
Figure: 5.15i and 5.16c

Baseline view: Refer to Figure 5.15i. Viewpoint 9 lies on Fife Coastal Path where it adjoins Lundin Golf Course on the western edge of Lower Largo. The slightly elevated nature of the viewpoint is such that it gains an open outlook across the golf course and Firth of Forth, and it is just possible to distinguish the power station at Cockenzie on the southern shoreline, out of shot, with more distant hills silhouetted against the skyline. In the centre of the view Methil Docks Turbine is a noticeable feature of the outlook, as is the steel fabrication plant and lighting masts on the FEP site that lie directly behind the turbine and are of a similar height. To the right of the view, out of shot, residential properties along the sea front are mostly orientated towards the coast and for the most part have no direct outlook towards the FEP site and the Development.

The viewpoint has been included in the assessment as it makes a suitable representation of more distant views from the coastal path around Largo Bay, north-east of the FEP site. It is also representative of views from the golf course and from a small number of residential properties that are orientated towards the FEP site and the Development directly behind the viewpoint.

Sensitivity: This viewpoint has a *high* sensitivity due to its location on the long distance and sign posted footpath, as well as its representation of residential properties. Users of the golf course will also gain views, although these are less sensitive due to their pre-occupation with their activity. There are also some scenic qualities in the coastal landscape seen in the view.

Magnitude of effect: Refer to Figure 5.15i. The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be *medium,* with the Development providing one of the defining influences in the view along with the influence of the baseline characteristics.

As with the previous viewpoint, there are a number of factors that limit the magnitude of effect. The presence of Methil Docks Turbine in the middle distance and in the same arc of view is particularly important as it introduces a certain familiarity to large-scale industrial structures, which has a moderating effect on views. The turbine also provides a beneficial scale comparison as it lies closer to the viewer so reducing the perceived scale of the Development and the eye catching impact that it might otherwise have if it were the only or predominant vertical element in the view. The open, uniform and expansive nature of the coastal view in which the Development will be seen is also important as it provides an appropriate receiving environment by limiting uncomfortable scale comparisons that can arise when turbines are located in smaller, more intimate and varied landscapes. Finally, the viewpoint is almost 6.0 km from the Development, at which distance the Turbine does not constitute the predominant component in the view, although it will be readily apparent.

While these factors limit the magnitude of effect, there are other factors that will increase it. The distance of the viewpoint from the Development ensures that it will be seen in some detail, with movement providing a contrast with the visual setting. Furthermore, the view is a direct outlook towards the Development for users of the footpath and for a small number of houses overlooking the golf course.

The Development will be the only visible element of the built scheme, with intervening built development screening all other infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view is judged to be *moderate* and will be significant with the Development having a material effect on the view. This is due to a combination of factors that results in a medium magnitude of effect and the high sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16c. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *small,* with the addition of the Development providing a small role in extending windfarm influence in the view.

Although Little Raith (24 km from the viewpoint) is theoretically visible from hub-height as a simultaneous view, in reality, distance, together with intervening vegetation and landform, is such that this windfarm (9 x 100 m turbines) will either be screened or will be barely discernible. Thus any potential for cumulative effects on the view lies chiefly between the Development added to the operational turbine (1 x 81 m) at Methil Docks (4 km from the viewpoint). The two turbines associated with the 2-B Proposed Energy Development (2 x 168.5/172.5 m) are also visible in the view (6 km from the viewpoint), however, they are still at a scoping stage with greater uncertainty over their future.

The principle factor that limits the cumulative magnitude of effect is the small number of turbines visible in the view, in this case four. From this viewpoint, all four turbines are seen simultaneously in a particularly narrow arc of view where they occupy a very small proportion of the full outlook available. This is important as it ensures that much of the baseline view

remains unaffected. The close proximity of the turbines is also important as it ensures that they appear as part of a slightly larger development rather than distinctly separate schemes. The disparity that exists between Methil Docks Turbine and the Development in terms of height and blade movement will be apparent at this distance, however, this is more a matter of detail and appearance rather than extending windfarm influence in the view.

Significance of cumulative effect: The cumulative effect on this view is judged to be *minor-moderate* and will be not significant. The addition of the Development to the Methil Docks Turbine will have a small effect in extending windfarm influence in the view, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to a combination of factors that results in a small cumulative magnitude of effect despite the high sensitivity of the receptor. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only slightly.

5.11 Viewpoint 10: Coaltown of Balgonie

Grid reference: E330570 N699768
Approximate distance to the development: 6.3 km
Approximate elevation: 70 m AOD
Receptor type: Road Users
Landscape character type: Lowland River Basins
Landscape designation: None
Figure: 5.15j and 5.16d

Baseline view: Refer to Figure 5.15j. Viewpoint 10 is located on a minor road that runs immediately east of Coaltown, joining with the B9130. This viewpoint gains an open outlook towards the Development across low-lying and intensively farmed *Lowland River Basins* landscape type, which extends to the limit of the view. Large, modern agricultural buildings are conspicuous features in the foreground whilst pylons and the built-up edge of Methil are also visible components in the middle distance. Methil Docks Turbine can just be seen on the horizon above a wooded area and provides a useful reference point for the location of the FEP site and the Development. Largo Law hill is also visible on the skyline to the far left of the view.

The viewpoint has been included in the assessment as it makes a suitable representation of effects on local visual amenity west of the Development. Residential properties in Coaltown gain little or no visibility of the Development due to the low-lying landform on which the settlement lies and general orientation of houses on the edge of the settlement away from the FEP site.

Sensitivity: This viewpoint has some sensitivity due to the rural nature of the view. However, the area is not covered by any landscape-related designations and it is not representative of residential views. The presence of some detracting features also lowers sensitivity. As such, sensitivity of the viewpoint to the Development is judged to be *medium.*

Magnitude of effect: Refer to Figure 5.15j. The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be *medium,* with the Development forming a readily apparent feature in the view, but with the baseline characteristics generally continuing to prevail.

This is due in part to the open outlook, and in this context the Development will occupy only a limited proportion of the available view with the remainder of the outlook remaining unaffected. The relatively large-scale and horizontal nature of the foreground and middle distance landform also provides a beneficial scale comparison with the Development ensuring that it appears relatively small in relation to its visual setting. The presence of detracting elements in the outlook of a vertical nature is also important, as it limits the eye-catching impact that the Development might have if it was the only or predominant vertical element in the view. The viewpoint is also over 6.0 km from the Development, at which distance the Turbine will not constitute the predominant component in the view, although it will be readily apparent.

The Development will be the only visible element of the built scheme, with intervening vegetation and landform screening all other infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view will be *minor-moderate* and will be not significant. The Development will have some effect on the view, but this will not result in a material change and it will not become the defining influence in the view. This is due to a combination of factors that contribute to the medium magnitude of effect and the medium sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16d. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *small,* with the addition of the Development providing a small role in extending windfarm influence in the view.

Although Little Raith (14 km from viewpoint) is theoretically visible from hub-height in successive views to the right, in reality, distance, together with intervening vegetation, is such that this windfarm (9 x 100 m turbines) will either be screened or will have, at best, a very small influence. Thus, any potential for cumulative effects on the view lies chiefly between the Development added to the operational turbine (1 x 81 m) at Methil Docks (7.5 km from viewpoint). The two turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also visible in the view (7 km from the viewpoint), however, they are still at a scoping stage with greater uncertainty over their future.

The principle factor that limits the cumulative magnitude of effect is the small number of turbines visible, in this case four. From this viewpoint, all four turbines are seen simultaneously where they occupy a relatively small proportion of the full available outlook and thereby leave much of the baseline view unaffected. Additionally, whilst Methil Docks turbine is theoretically visible from near full height, in reality it is likely that intervening vegetation and built development will limit visibility to the hub-height.

Significance of cumulative effect: The cumulative effect on this view is judged to be *minor* and will be not significant. The addition of the Development to the Methil Docks Turbine may have a small effect in extending windfarm influence in the view, but the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to a combination of factors that results in a small cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only slightly.

5.12 Viewpoint 11: A916, North-East of Kennoway

Grid reference: E336994 N704771
Approximate distance to the development: 6.5 km
Approximate elevation: 120 m AOD
Receptor type: Road Users
Landscape character type: Lowland Dens
Landscape designation: None
Figure: 5.15k and 5.16e

Baseline view: Refer to Figure 5.15k. Viewpoint 11 is located at the entrance to Letham Feus Caravan Park on the A916 north-east of Kennoway. This viewpoint is on rising ground and gains an outlook across undulating and intensively farmed *Lowland Dens* landscape type, which extends as far as a low tree lined ridge in the middle distance silhouetted against the back drop of the Firth of Forth. Methil Docks Turbine is apparent in the view above the treed

ridgeline, as is the steel fabrication plant and lighting masts on the FEP site further to the right. Other incongruous elements in the view include modern agricultural buildings.

The viewpoint has been included in the assessment as it makes a suitable representation of effects on local visual amenity north of the FEP site and the Development, as well as representing views from the road.

Sensitivity: This viewpoint has some sensitivity due to the rural nature of the view. However, the area is not covered by any landscape-related designations and it is not representative of residential views. The presence of some detracting features also lowers sensitivity. As such, sensitivity of the viewpoint to the Development is judged to be *medium.*

Magnitude of effect: Refer to Figure 5.15k. The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be *medium,* with the Development forming a readily apparent feature in the view, but with the baseline characteristics generally continuing to prevail.

This is due in part to the relatively open outlook and in this context the Development will occupy only a limited proportion of the available view with the remainder of the outlook remaining unaffected. The relatively large-scale and horizontal nature of the foreground and middle distance view also provides a beneficial scale comparison with the Development ensuring that it appears relatively small in relation to its visual setting. The presence of detracting elements in the outlook of a vertical nature is also important as it limits the eye-catching impact that the Development might have if it was the only or predominant vertical element in the view. The viewpoint is also approximately 6.5 km from the Development, at which distance the Turbine will not constitute the predominant component in the view, although it will be readily apparent.

The Development will be the only visible element of the built scheme, with intervening landform screening all other infrastructure. Cranes will be visible as a short-term effect during the construction and decommissioning periods. There will be no permanent, irreversible effects on the view.

Significance of effect: The effect on this view will be *minor-moderate* and will be not significant. The Development will have some effect on the view, but this will not result in a material change and it will not become the defining influence in the view. This is due to a combination of factors that contribute to the medium magnitude of effect on the view and the medium sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16e. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *small,* with the addition of the Development providing a small role in extending windfarm influence in the view.

The wireline indicates that Little Raith (22 km from viewpoint) is theoretically visibility, with all 9 turbines seen from blade-tip as a successive view to the right of the Development. In reality, distance, together with intervening vegetation and landform, is such that this windfarm will almost certainly be screened. Thus, any potential for cumulative effects on the view lies chiefly between the Development added to the operational turbine (1 x 81 m) at Methil Docks (5 km from viewpoint). The two turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also visible in the view (7.5 km from the viewpoint), however, they are still at a scoping stage with greater uncertainty over their future.

The principle factor that limits the cumulative magnitude of effect is the small number of turbines visible in the view, in this case four. From this viewpoint, all four turbines are seen simultaneously where they occupy a relatively small proportion of the full available outlook

leaving much of the baseline view unaffected. Additionally, whilst Methil Docks turbine is theoretically visible from near full height, it is likely that intervening vegetation and landform will limit visibility to hub-height.

Significance of cumulative effect: The cumulative effect on this view is judged to be *minor* and will be not significant. The addition of the Development to the Methil Docks Turbine may have a small effect in extending windfarm influence on the view, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to a combination of factors that results in a small cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence will only marginally increase as the size and position of these turbines relative to the Development ensuring that both schemes will tend to read as a single grouping of turbines in the view.

5.13 Viewpoint 12: Largo Law

Grid reference: E342674 N704970
Approximate distance to the development: 9.0 km
Approximate elevation: 285 m AOD
Receptor type: Walkers
Landscape character type: Pronounced Volcanic Hills and Craigs outcrop/Lowland Dens
Landscape designation: Edge of Largo Law LLA
Figure: 5.15l and Figure 5.16f

Baseline view: Refer to Figure 5.15l. Viewpoint 12 is situated on the summit of Largo Law, a local highpoint located on the edge of Largo Law LLA. Views from the summit in the direction of the Development extend across the lower slopes of the hill and clearly show the general character of the more extensive *Lowland Dens* landscape type that encloses the hill and continues as far as the coast. The coastal town of Lower Largo is a noticeable component of the view as are the slightly more distant but extensive coastal towns of Leven, Methil and Buckhaven, which have coalesced. Methil Docks Turbine is also evident in the view as is the steel fabrication plant and lighting masts on the FEP site. Beyond the coastal edge, expansive views are obtained across the Firth of Forth and it is just possible to see the southern shoreline and line of distant hills behind silhouetted against the skyline.

The viewpoint has been included in the assessment as it makes a suitable representation of effects on local visual amenity from the edge of an area designated for its scenic qualities.

Sensitivity: This viewpoint has a *high* sensitivity due to its location just within an area designated for its scenic qualities, despite the visible presence of a number of detracting features in views beyond the designation.

Magnitude of effect: Refer to Figure 5.15l. The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be between *small* and *medium,* with the Development forming an apparent feature in the view, while the baseline characteristics continue to prevail.

This magnitude of effect results from a number of considerations. The Development will be visible, with its scale, vertical form and movement providing a contrast with the existing view. However, the large-scale and generally horizontal nature of the coastal view provides a beneficial scale comparison with the Development ensuring that it will appear as a relatively small component within the visual setting. The wide, open outlook also ensures that the Development will occupy a limited part of the full available view, with the remainder of the outlook remaining unaffected. The presence of Methil Docks Turbine and, to a lesser extent, masts on the FEP site is also important as it introduces strong vertical elements into the outlook, thereby preventing the Development from providing the eye-catching vertical impact that might otherwise occur if no other such elements are in the view. Finally, the distance of the Development from the viewpoint is approximately 9.0 km, which ensures that the Turbine will not be the defining influence in the view although it will be apparent.

Significance of effect: The effect on this view will be between *minor-moderate* and *moderate* but will be not significant. The Development will have some effect on the view, but this will not result in a material change and it will not become the defining influence in the view. This is due to a combination of factors that restrict the magnitude of effect on the view despite the high sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16f. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *very small,* with the addition of the Development providing a minor role in extending windfarm influence in the view.

The principal factor that limits the cumulative magnitude of effect is the small number of turbines that are likely to be visible in the view. The wireline indicates that Little Raith (26 km from the viewpoint), Westfield (22 km from the viewpoint) and Lochelbank (32 km from the viewpoint) are all theoretically visibility in successive views to the right of the Development. In reality, the distances involved, together with intervening vegetation and landform is such that all three windfarms will either be screened or will be barely discernible. Thus, any potential for cumulative effects on the view lies chiefly between the Development added to the operational turbine (1 x 81 m) at Methil Docks (7.0 km from viewpoint). The two turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also visible (9 km from the viewpoint), however, they are still at scoping stage with greater uncertainty over their future.

From this viewpoint, all four turbines are seen simultaneously in a particularly narrow arc of view where they occupy a very small proportion of the full outlook available. This is important as it ensures that much of the baseline view remains unaffected. The close proximity of the turbines is also important as it ensures that they appear as part of a slightly larger development rather than distinctly separate schemes. The disparity that exists between Methil Docks Turbine and the Development in terms of height and blade movement is likely to be apparent at this distance, however, this is a matter of detail and appearance rather than of extending windfarm influence in the view.

Significance of cumulative effect: The cumulative effect on this view is judged to be *minor* and will be not significant. The addition of the Development to the Methil Docks Turbine may have some limited effect in extending windfarm influence on the view, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to a combination of factors that results in a very small cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only slightly.

5.14 Viewpoint 13: Fife Coastal Path, King Craig Point

Grid reference: E346176 N699827
Approximate distance to development: 9.5 km
Approximate elevation: 5 m AOD
Receptor type: Walkers/Recreational Users
Landscape character type: Pronounced Volcanic Hills and Craigs Outcrop/Intertidal Shores
Landscape designation: Edge of East Neuk candidate LLA
Figure: 5.15m and 5.16g

Baseline view: Refer to Figure 5.15m. Viewpoint 13 lies on Fife Coastal Path in the vicinity of King Craig Point, on the coastal edge of East Neuk LLA. The view extends across Largo Bay to the opposite shoreline and more distant hills that lie beyond. The combined built-up edges of Buckhaven, Leven and Methil can be seen in a certain amount of detail spreading along the shore and includes the steel fabrication plant on the FEP site. Methil Docks Turbine

is just apparent in the view where it is seen below the general backdrop of hills, although movement is barely detectable. Further to the left, out of shot, the outlook extends across the Firth of Forth as far as the southern shoreline and line of distant hills behind, although any detail is largely indistinguishable. Steam plumes from the power station at Cockenzie are just evident.

The viewpoint has been included in the assessment as it represents the first available views towards the Development from the long distance footpath approaching from the east. It also makes a suitable representation of effects on users of beaches around Largo Bay and an area designated for its scenic qualities.

Sensitivity: This viewpoint has a *high* sensitivity due largely to its location on the long distance footpath and proximity to recreational beaches. There are also scenic qualities in the coastal landscape seen in the view.

Magnitude of effect: Refer to Figure 5.15m. The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be between *small* and *medium,* with the Development forming an apparent feature in the view, while the baseline characteristics continue to prevail.

This is due in part to the large-scale and strongly horizontal nature of the coastal view, which provides a beneficial scale comparison with the Development ensuring that it will appear as a relatively small component within the visual setting. The wide, open outlook also ensures that the Development will occupy a limited part of the full available view, with the remainder of the outlook remaining unaffected. The built-up nature of the view in the direction of the Development and presence of vertical elements is also important as it limits the eye-catching impact that the Development might have if it was the only or predominant vertical element in the view. Finally, the distance of the Development from the viewpoint is approximately 9.5 km, which ensures that the Turbine will not be the defining influence in the view although it will be apparent.

Significance of effect: The effect on this view will between *minor-moderate* and *moderate* but will be not significant. The Development will have some effect on the outlook, but this will not result in a material change and it will not become the defining influence in the view. This is due to a combination of factors that restricts the magnitude of effect on the view despite the high sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16g. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *very small,* with the addition of the Development providing a minor role in extending windfarm influence in the view.

An important factor in determining the cumulative magnitude of effect is the number of turbines that are likely to be visible in the view. The wireline indicates that Little Raith (28 km from the viewpoint) and Westfield (25 km from the viewpoint) are theoretically visible from blade-tip, as a simultaneous view with the Development. In reality, distance, together with intervening vegetation and landform is such that both windfarms will almost certainly be screened. Thus, any potential for cumulative effects on the view lies chiefly between the Development added to the operational turbine (1 x 81 m) at Methil Docks (8.0 km from the viewpoint). The two turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also visible in the view (9 km from the viewpoint), however, they are still at a scoping stage with some uncertainty over their future.

From this viewpoint, all four turbines are seen simultaneously in a relatively narrow arc of view where they occupy a small proportion of the full outlook available. Further, the proximity of the turbines is such that they appear as part of a slightly larger development rather than distinctly separate schemes. The disparity that exists between the Methil Docks

Turbine and the Development in terms of height and blade movement is likely to be apparent at this distance, however, this has little bearing on extending windfarm influence in the wider view.

Significance of cumulative effect: The cumulative effect on this view is judged to be *minor* and will be not significant. The addition of the Development to the Methil Docks Turbine may have some limited effect in extending windfarm influence on the view, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to a combination of factors that results in a very small cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only slightly.

5.15 Viewpoint 14: Local Road East of Montrave

Grid reference: E340324 N707256
Approximate distance to the development: 9.6 km
Approximate elevation: 150 m AOD
Receptor type: Road Users
Landscape character type: Pronounced Volcanic Hills and Craigs/Lowland Dens
Landscape designation: On boundary with Tarvit and Ceres LLA
Figure: 5.15n

Baseline view: Viewpoint 14 is located on the local road between Montrave and Woodside. The view extends across two landscape types, the gently undulating *Pronounced Volcanic Hills and Craigs* type in the immediate foreground and the more intensively farmed and wooded *Lowland Dens* type in the middle distance. Methil Docks Turbine is just visible on the skyline above an extensive wooded area. Further to the right, the steel fabrication plant and lighting masts on the FEP site are also visible as minor components of the view together with the built-up edge of Leven. The Firth of Forth can also be seen on the distant horizon.

The viewpoint has been included in the assessment as it makes a suitable representation of effects on local visual amenity north of the Development, close to the boundary with an area designated for its scenic qualities and on limit of theoretical visibility indicated on the ZTV. Visibility of the Development from this road and other local roads in the vicinity is quite limited and so this view represents a rare glimpse towards it.

Sensitivity: This viewpoint has some sensitivity due to the rural nature of the view. However, the outlook towards the Development is not covered by any landscape-related designations and it is not representative of residential views. As such, sensitivity to the Development is judged to be *medium.*

Magnitude of effect: The magnitude of effect on this view as indicated by the ZTV, wireline and photomontage is judged to be between *small* and *medium,* with the Development forming an apparent feature in the view while the baseline characteristics continue to prevail.

This is due in part to the large-scale and horizontal nature of the landform, which provides a beneficial scale comparison with the Development ensuring that it will appear as a relatively small component within the visual setting. The wide, open outlook also ensures that the Development will occupy a limited part of the full available view, with the remainder of the outlook remaining unaffected. The wooded nature of the view is important as it helps to screen the lower part of the Development which in turn reduces the vertical impact that it might otherwise have when seen at full height. The working nature of the landscape and presence of detracting elements in the outlook of a vertical nature is also important as it limits the eye-catching impact that the Development might have if it was the only or predominant vertical element in the view. Finally, the distance of the Development from the viewpoint is over 9.5 km, which ensures that the Development will not be the defining influence in the view although it will be apparent.

Significance of effect: The effect on this view will be between *minor* and *minor-moderate* and will be not significant. The Development will have some effect on the view, but this will

not result in a material change and it will not become the defining influence in the view. This is due to a combination of factors that contribute to a small to medium magnitude of effect on the view and the medium sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

5.16 Viewpoint 15: A917

Grid reference: E345522 N7029896
Approximate distance to the development: 10.0 km
Approximate elevation: 35 m AOD
Receptor type: Road Users
Landscape character type: Coastal Terrace
Landscape designation: On boundary with Largo Law LLA
Figure: 5.15o

Baseline view: Viewpoint 15 lies on the A917 approximately mid-way between Lower Largo and Elie. The general outlook seen from here is characteristic of the low-lying and intensively farmed *Coastal Terrace* landscape type where it has not been encroached upon by urban development. Apart from the occasional shelter belt and small coniferous plantation, vegetation is almost lacking and this affords expansive views across the Firth of Forth, further to the left of the viewpoint. In the centre of the view, across Largo Bay, the built-up edges of Buckhaven, Leven and Methil can be seen in some detail. Methil Docks Turbine is also apparent in the same arc of view, together with the steel fabrication plant on the FEP site.

The viewpoint has been included in the assessment as it makes a suitable representation of effects on local visual amenity east of the Development, on the western boundary of an area designated for its scenic qualities. Visibility of the Development from this road and local roads further to the east is quite limited due to the low-lying landform and presence of screening vegetation and so this view represents a rare glimpse towards the turbine.

Sensitivity: This viewpoint has some sensitivity due to the rural nature of the view. However, the outlook towards the Development is not covered by any landscape-related designations and it is not representative of residential views. As such, sensitivity to the Development is judged to be *medium.*

Magnitude of effect: The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be between *small* and *medium,* with the Development forming an apparent feature in the view while the baseline characteristics continue to prevail.

This is due in part to the large-scale and broadly horizontal nature of the landform, which provides a beneficial scale comparison with the Development ensuring that it will appear as a relatively small component within the visual setting. The plantations in the foreground have a similar effect as they appear much larger than the Development. The wide, open outlook also ensures that the Development will occupy a limited part of the full available view, with the remainder of the outlook remaining unaffected. The working nature of the landscape and presence of detracting elements in the outlook of a vertical nature is also important as this limits the eye-catching impact that the Development might have if it was the only or predominant vertical element in the view. The viewpoint itself lies approximately 10.0 km from the Development and this ensures that the Turbine will not constitute the predominant component of the view, although it will be apparent.

Significance of effect: The effect on this view will between *minor* and *minor-moderate* and will be not significant. The Development will have some effect on the view, but this will not result in a material change and it will not become the defining influence in the view. This is due to a combination of factors that contribute to a small to medium magnitude of effect on the view and the medium sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

5.17 Viewpoint 16: A921/ Fife Coastal Path, Kirkcaldy

Grid reference: E327955 N690297
Approximate distance to the development: 12.0 km
Approximate elevation: 5 m AOD
Receptor type: Residents/Walkers/Recreational Users/Cyclists/Road Users
Landscape character type: Urban edge with Coastal Hills/Intertidal Shores
Landscape designation: None
Figure: 5.15p

Baseline view: Viewpoint 16 lies on the promenade at Kirkcaldy from where long views are obtained along the coastline in the direction of the Development, although the FEP site and Methil Docks Turbine are barely discernible. The general character of the *Coastal Hills* landscape type is evident in more distant views, but the immediate foreground has been extensively modified by built development which has encroached up to the coastal edge. Largo Law is just visible on the distant skyline, in the centre of the view, as is the distant coastline where it sweeps around Largo Bay to King Craig Point. Further to the right, out of shot, the view takes in the open expanse of the Firth of Forth and the southern shoreline, where the power station at Cockenzie is more apparent.

The viewpoint has been included in the assessment as it is representative of long views south-west of the Development from a number of receptors including the long distance footpath, houses on the coastal edge of the town with available views, users of the beach, A921 coastal road and regional cycle route 63 where it follows the promenade.

Sensitivity: This viewpoint has a *high* sensitivity due largely to its location on the long distance footpath, as well as its representation of residential occupiers and users of the beach. There are also some scenic qualities in the coastal view despite the built-up nature of the area.

Magnitude of effect: The magnitude of effect on this viewpoint as indicated by the ZTV, wireline and photomontage is judged to be *small* with the Development providing a limited influence on the outlook.

There are a number of factors that limits the magnitude of effect, of which distance is one with the viewpoint lying approximately 12.0 km from the Development. This ensures that the Development will appear as a small component in the visual setting. The large-scale and broadly horizontal nature of the coastal view in which the Development will be seen is also important as it provides an appropriate receiving environment by limiting uncomfortable scale comparisons. The wide expanse of the view available from here is important too, as only a small and distant part of it will be affected.

Not-withstanding this, the Development will have some vertical impact on the horizontal nature of the view. This, together with movement ensures that the Development will be apparent in the view, although the baseline characteristics will continue to define the view.

Significance of effect: The effect on this view will be *minor-moderate* and will be not significant. The Development will have some effect on the view, but this will not result in a material change and it will not become the defining influence in the view. This is due to a combination of factors that contribute to a small magnitude of effect on the view despite the high sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: None

5.18 Viewpoint 17: Local Road North of Kinglassie

Grid reference: E323564 N699742

Approximate distance to the development: 13.0 km
Approximate elevation: 150 m AOD
Receptor type: Walkers/Road Users
Landscape character type: Pronounced Volcanic Hills and Craigs
Landscape designation: None
Figure: 5.15q and 5.16h

Baseline view: Refer to Figure 5.15q. Viewpoint 17 is located on a public footpath where it meets a minor road to the north of Kinglassie. The viewpoint gains an outlook towards the FEP site and the Development from across rising ground within the *Pronounced Volcanic Hills and Craigs* landscape type, which extends to the middle distance. The built-up edge of Glenrothes is just visible on the wooded ridgeline to the left of the view where gaps in the vegetation occur.

The viewpoint has been included in the assessment as it makes a suitable representation of effects on local visual amenity west of the Development from some distance. It also represents views from the right of way.

Sensitivity: This viewpoint has some sensitivity due to the largely rural nature of the view. However, the area is not covered by any landscape-related designations and it is not representative of residential views. As such, sensitivity to the Development is judged to be *medium.*

Magnitude of effect: Refer to Figure 5.15q. The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *small,* with the Development providing a limited influence on the view that may be missed by the casual observer.

This is largely due to distance, the viewpoint lies approximately 13.0 km from the Development where it will appear as a small component in the view. The view is generally open and expansive and this provides an appropriate receiving environment for the Development, limiting uncomfortable scale comparisons. The wide expanse of the view available is also important as only a small and distant part of the full outlook will be affected. The Development will have some vertical impact in this predominantly horizontal view and it is this, together with movement, that will make it a visible component in the outlook.

Significance of effect: The effect on this view is judged to be *minor* and will be not significant. The Development will have some effect on the outlook, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline components. This is due to the combination of factors that contribute to a small magnitude of effect and the medium sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: None

Cumulative magnitude of effect: Refer to Figure 5.16h. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *negligible*, with the addition of the Development providing a barely discernible role in extending windfarm influence in the view.

The wireline indicates that Little Raith (9 km from the viewpoint), Methil Docks turbine (14.5 km from the viewpoint) and the 2-B Energy Proposed Development (14.0 km from the viewpoint) are theoretically visible in successive views, together with the Development in close proximity to Methil Docks. In reality, distance together with intervening vegetation, landform and buildings is such that Methil Docks turbine will almost certainly be screened or be barely discernible. Thus, any potential for cumulative effects on the view lies chiefly between the Development added to the nine consented turbines at Little Raith (9 x 100 m). The two turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also likely to be visible given their offshore location, however, they are still at a scoping stage with greater uncertainty over their future.

An important factor limiting cumulative magnitude is the number of turbines visible, in this case the Development is adding one additional turbine to the consented situation. Distance is also important, and, as noted above, the Development will appear as a small component of

the view. Although both developments are widely spaced apart and will therefore read as two distinctly separate schemes, they will be seen in the context of an open and expansive view with the Development in particular occupying a very small and distant part of it.

Significance of cumulative effect: The cumulative effect on this view is judged to be *negligible* and will be not significant. The addition of the Development to Little Raith is unlikely to have any effect in extending windfarm influence on the view, and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to a combination of factors that results in a negligible cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only slighty.

5.19 Viewpoint 18: Fife Coastal Path, Kinghorn

Grid reference: E327614 N687573
Approximate distance to development: 14.0 km
Approximate elevation: 10 m AOD
Receptor type: Walkers/Recreational Users
Landscape character type: Pronounced Volcanic Hills & Craigs/Coastal Hills/Intertidal Shores
Landscape designation: Edge of Cullaloe Hills and Coast LLA
Figure: 5.15r

Baseline view: Viewpoint 18 lies on Fife Coastal Path north of Kinghorn, on the coastal edge of Cullaloe Hills and Coast LLA. The outlook obtained from here is similar to that seen in other views from the coastal path south-west of the Development, albeit the view is more distant and takes in a section of *Pronounced Volcanic Hills and Craigs* landscape type and *Intertidal Shores* in the foreground.

The viewpoint has been included in the assessment as it represents the first available views towards the Development from the long distance footpath approaching from the south-west. It also makes a suitable representation of effects on users of adjacent beaches and on local visual amenity from the edge of an area designated for its scenic qualities. As noted in relation to Viewpoint 16, the FEP site and Methil Docks Turbine are barely discernible.

Sensitivity: This viewpoint has a *high* sensitivity due mainly to its location on the long distance footpath. There are also scenic qualities in the coastal landscape seen in the view.

Magnitude of effect: The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *small,* with the Development providing a limited influence in the view that may be missed by the casual observer.

This is largely due to distance, the viewpoint is approximately 14.0 km from the Development from where the Turbine will appear as a small component in the view. The view is open and expansive and this provides an appropriate receiving environment for the Development, limiting uncomfortable scale comparisons. The wide expanse of the view available is also important as only a small and distant part of the full outlook will be affected. The Development will have some vertical impact in this predominantly horizontal view and it is this that will make it a visible component in the outlook, together with movement. The orientation of the view for users of the footpath heading north-east is also directly towards the Development.

Significance of effect: The effect on this view is judged to be *minor-moderate* and will be not significant. The Development will have some effect on the outlook, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline components. This is due to the combination of factors that contribute to the small magnitude of effect on the view despite the high sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: None

5.20 Viewpoint 19: East Lomond Hill (Lomond Hills)

Grid reference: E324446 N706174

Approximate distance to the development: 14.5 km
Approximate elevation: 450 m AOD
Receptor type: Walkers
Landscape character type: Uplands/Lowland River Basins/Lowland Dens
Landscape designation: Lomond Hills Regional Park and LLA
Figure: 5.15s and 5.16i

Baseline view: Refer to Figure 5.15s. Viewpoint 19 is situated on the summit of East Lomond Hill, a popular walking hill located within Lomond Hills Regional Park and LLA. Whilst coniferous woodland is present on the lower slopes of the hills, the more elevated parts are open and this allows panoramic views to be obtained over long distances. Views in the direction of the FEP site and the Development extend across the open *Uplands* landscape type in the immediate foreground and encompass the more extensive and settled *Lowland River Basin*s and *Lowland Dens* landscape types that extend as far as the coast. Urban development associated with Glenrothes extends to the base of the Lomond Hills and is a noticeable component of views in the direction of the Development along with pylons. Methil Docks Turbine is just discernible on the coastline as a minor component of the wider outlook that includes Largo Law to the left of the view and the Firth of Forth further to the right.

The viewpoint has been included in the assessment as it lies in a particularly open and elevated part of the study area north-west of the FEP site, from where long views are available towards the Development close to the limit of theoretical visibility indicated on the ZTV. The viewpoint also represents views from the Regional Park and LLA

Sensitivity: This viewpoint has a *high* sensitivity due to its representation of the Regional Park and LLA designation. Visitors to this important recreational resource will have an interest in and focus upon views of the landscape.

Magnitude of effect: Refer to Figure 5.15s. The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *small,* with the Development providing a limited influence in the view that may be missed by the casual observer.

This is due largely to distance, the viewpoint lies over 14 km from the Development, from where the Turbine will appear as a small component of the outlook. The view is open and expansive and this provides an appropriate receiving environment for the Development, limiting uncomfortable scale comparisons. The panoramic nature of views available from here is also important, as only a very small and distant part of the full outlook will be affected. Urban influences present in the view will also reduce the eye-catching impact that the Development might otherwise have. The Development will have some vertical impact in this predominantly horizontal landscape and this, together with movement, will make it visible in clear conditions.

Significance of effect: The effect on this view is judged to be *minor-moderate* and will be not significant. The Development will have some effect on the outlook, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to the combination of factors that contribute to a small magnitude of effect on the view despite the high sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16i. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *negligible*, with the addition of the Development providing a barely discernible role in extending windfarm influence in the view.

The wireline indicates that Little Raith (15 km from the viewpoint), Westfield (8 km from the viewpoint), Methil Docks (15 km from the viewpoint) and 2-B Energy Proposed Development (16 km from the viewpoint) are theoretically visible in successive views, together with the Development. In reality, distance together with intervening vegetation, landform and

buildings is such that Little Raith and Methil Docks will either be screened or will, at best, have a very small influence. Similarly, although Westfield lies much closer to the viewpoint, the wireline indicates visibility is limited to four blade-tips and it is likely that intervening landform and vegetation will mostly screen these. Thus, any potential for cumulative effects on the view lies chiefly between the Development added to the two scoping turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m). However, the proximity of these turbines to each other is such that, from this viewpoint, they are likely to read as a single grouping and will only marginally increase windfarm influence in the view.

Significance of cumulative effect: The cumulative effect on this view is judged to be *negligible* and will be not significant. The addition of the Development to the 2-B Energy Proposed Development is unlikely to have any effect in extending windfarm influence in the view, and the prevailing characteristics of the view will continue to be defined by the existing baseline characteristics. This is due to a combination of factors that results in a negligible magnitude of effect.

5.21 Viewpoint 20: Local Road North-West of Kinghorn

Grid reference: E326111 N687867
Approximate distance to the development: 15.0 km
Approximate elevation: 105 m AOD
Receptor type: Road Users
Landscape character type: Pronounced Volcanic Hills and Craigs
Landscape designation: Cullaloe Hills and Coast LLA
Figure: 5.15t and 5.16j

Baseline view: Refer to Figure 5.15t. Viewpoint 20 is located on a minor road north-west of Kinghorn. The view from this more elevated location extends across open, gently undulating and intensively farmed lower slopes of the *Pronounced Volcanic Hills and Craigs* landscape type, which occupies the foreground and middle distance view. The coastal town of Kirkcaldy is clearly evident below the horizon as are wooded coastal hills that continue further along the coast line towards the FEP site and the Development. Methil Docks Turbine is just discernible as a minor component of the distance view. To the right, expansive views are obtained across the Firth of Forth to the southern shoreline where the built-up nature of the coast is more evident.

The viewpoint has been included in the assessment as it lies in a relatively open and elevated part of the landscape south-west of the FEP site from where long views are available towards the Development. The viewpoint also represents views from within the Cullaloe Hills and Coast LLA. Visibility of the Development from this road and other local roads is, however, quite limited and so this view represents a rare glimpse towards the Turbine.

Sensitivity: This viewpoint has a *high* sensitivity due largely to its representation of the LLA designation.

Magnitude of effect: Refer to Figure 5.15t. The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *small,* with the Development providing a limited influence on the view that may be missed by the casual observer.

This is due largely to distance, the viewpoint lies approximately 15 km from the Development from where the Turbine will appear as a small component in the view. The view is open and expansive and this provides an appropriate receiving environment for the Development, limiting uncomfortable scale comparisons. The wide expanse of the view available from here is also important, as only a small and distant part of the full outlook will be affected. The Development will have some vertical impact in this predominantly horizontal landscape and it is this that will make it visible in clear conditions, along with movement.

Significance of effect: The effect on this view is judged to be *minor-moderate* and will be not significant. The Development will have some effect on the outlook, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined

by the baseline characteristics. This is due to the combination of factors that contribute to a small magnitude of effect on the view despite the high sensitivity of the viewpoint.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16j. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *negligible,* with the addition of the Development providing a barely discernible role in extending windfarm influence in the view.

This is partly due to the small number of turbines visible in the view, in this case the Development in conjunction with the operational turbine (1 x 81 m) at Methil Docks (17 km from the viewpoint) and the two scoping turbines (2 x 168.5/172.5 m) associated with the 2-B Energy Proposed Development (14 km from the viewpoint). Distance and the wide expanse of view available is also important, as this ensures that these turbines will appear as small components in the view. All four turbines are also seen in the same narrow arc of view and will therefore only occupy a very small and distant part of the full outlook available. The close proximity of the Development and the 2-B Energy Proposed Development is important too as, from this viewpoint, they are likely to appear as part of a single grouping of turbines. Furthermore, the disparity between these turbines and Methil Docks turbine in terms of height is less noticeable due to distance, but also because the Development and the 2-B Energy Proposed development are seen in front of the Methil Docks turbine from this direction and naturally they appear to be taller due to the effects of perspective.

Significance of cumulative effect: The cumulative effect on this view is judged to be *negligible* and will be not significant. The addition of the Development to the Methil Docks Turbine is unlikely to have any effect in extending windfarm influence on the view and the prevailing characteristics of the view will continue to be defined by the existing baseline characteristics. This is due to a combination of factors that results in a negligible cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only marginally.

5.22 Viewpoint 21: Gullane

Grid reference: E347899 N683064
Approximate distance to the development: 19.0 km
Approximate elevation: 25 m AOD
Receptor type: Residents/Recreational Users
Landscape character type: Coastal Margins (East Lothian)
Landscape designation: Area of Great Landscape Value (East Lothian)
Figure: 5.15u

Baseline view: Viewpoint 21 is located on the southern shore of the Firth of Forth at Gullane. From here, open, expansive and strongly horizontal views are obtained across the coastal estuary in the direction of the FEP site and the Development. A line of hills that define the northern shoreline are visible on the horizon and includes the distinctive summit of Largo Law. Below the hills, urban development along shoreline is just distinguishable but lacks any real detail. This includes Methil Docks turbine, which is barely discernible.

This view has been included in the assessment as it represents the closest available views of the FEP site and the Development from popular beaches along the southern shores of the Firth of Forth. It also represents views available from some houses on the coastal edge of the settlement.

Sensitivity: This viewpoint has a *high* sensitivity due to its location on the coastal edge and also its representation of residential occupiers. There are also scenic qualities in the coastal landscape seen in the view.

Magnitude of effect: The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *very small,* with the Development providing a minor influence in the wider outlook and only in clear conditions.

This is due largely to distance, the viewpoint lies approximately 19 km from the Development from where the Turbine will appear as an inconspicuous component of the outlook. The large-scale and strongly horizontal nature of the coastal view is important as it provides an appropriate receiving environment for the Development, limiting uncomfortable scale comparisons. The wide expanse of the view available from here is important too, as only a very small and distant part of the full outlook will be affected. The Development will have some vertical impact in this horizontal landscape and it is this that will make it visible in clear conditions, with some movement likely to be discernible.

Significance of effect: The effect on this view is judged to be *minor* and will be not significant. The Development may have some very limited effect on the outlook, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline characteristics. This is due to the combination of factors that contribute to a very small magnitude of effect on the view.

Variances of Consented Scheme and Revised Scheme: The redundant power station at Methil Docks has been demolished and the consented turbine at Methil Docks is now operational and present in the baseline view. Neither change is judged to have affected the sensitivity of the viewpoint or the magnitude of effect for the revised scheme.

Cumulative magnitude of effect: Refer to Figure 5.16k. The cumulative magnitude of effect on this viewpoint as indicated by the cumulative ZTV and wireline is judged to be *negligible,* with the addition of the Development providing a barely discernible role in extending windfarm influence in the view.

The wireline indicates that Little Raith (29 km from the viewpoint), Methil Docks (19 km from the viewpoint) and the 2-B Energy Proposed Development (17.5 km from the viewpoint) are theoretically visible in the same arc of view, together with the Development. In reality, distance ensures that Little Raith will be barely discernible and so potential for cumulative effects on the view lies chiefly between the Development added to the operational turbine at Methil Docks (1 x 81 m). The two turbines associated with the 2-B Energy Proposed Development (2 x 168.5/172.5 m) are also visible, however, these are at a scoping stage with greater uncertainly over future.

All four turbines are seen in a particularly narrow arc of view at distances of 17 km or more where they occupy a very small and distant part of the much wider outlook. The Development is also seen directly behind the 2-B Energy Proposed Development and, as such, these two schemes will tend to read as part of a single grouping of turbines, albeit the 2-B turbines will be the more noticeable due to their closer proximity to the viewpoint.

Significance of cumulative effect: The cumulative effect on this view is judged to be *negligible* and will be not significant. The addition of the Development to the Methil Docks Turbine is unlikely to have any effect in extending windfarm influence on the view and the prevailing characteristics of the view will continue to be defined by the existing baseline characteristics. This is due to a combination of factors that results in a negligible cumulative magnitude of effect. Should the 2-B Energy Proposed Development also be consented then windfarm influence on the view will increase, but only marginally.

5.23 Viewpoint 22: Calton Hill, Edinburgh

Grid reference: E326281 N674253
Approximate distance to the development: 26.0 km
Approximate elevation: 100 m AOD
Receptor type: Recreational Users
Landscape character type: Urban
Landscape designation: None, but part of a World Heritage Site
Figure: 5.15v

Baseline view: Viewpoint 22 is located on the summit of Calton Hill, an important landmark and site of a number of monuments located just to the east of the city centre. From here, open, expansive and strongly horizontal views are obtained across densely built-up parts of Edinburgh that include tall commercial buildings and cranes on the dockside. Beyond the city, the view extends across the Firth of Forth towards the Cullaloe Hills, which define the northern shoreline approximately 11 km away. Urban development along the northern shoreline is visible in some detail and includes the settlements of Burntisland, Kinghorn and Kirkcaldy, mostly seen to the left of the view and out of shot. More distant views are possible further along the shoreline in the direction of the FEP site and Development, as indicated in the photoview, but these progressively lack any detail. Methil Docks turbine cannot be distinguished at this distance.

This viewpoint has been included in the assessment as it represents potential 'backdrop' views of the Development from the summit of Calton Hill.

Sensitivity: This viewpoint has a *high* sensitivity due to the importance attached to this landmark feature. There are also some scenic qualities evident in the coastal outlook, notwithstanding the built-up nature of the foreground view.

Magnitude of effect: The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *negligible,* with the Development providing a barely discernible influence in the wider outlook.

This is due primarily to distance, the viewpoint lies over 26 km from the Development from where the Turbine will appear faint and indistinguishable. The wide expanse of the view available from here is important too as is the urban context of the foreground, which is more likely to provide a distraction in 'backdrop' views from the hill.

Significance of effect: The effect on this view is judged to be *negligible* and will be not significant. The Development is unlikely to have any effect on the outlook and, as such, the prevailing characteristics of the view will continue to be defined by the baseline components. This is due to the combination of factors that contribute to a negligible magnitude of effect.

5.24 Viewpoint 23: North Berwick

Grid reference: E355116 N685343
Approximate distance to the development: 22.5 km
Approximate elevation: 3 m AOD
Receptor type: Residents/Recreational Users
Landscape character type: Urban edge with Coastal Margins (East Lothian)
Landscape designation: None
Figure: 5.15w

Baseline view: Viewpoint 23 is located on the coastal edge of North Berwick where there are a number of popular beaches. Views from here extend northwards across the widest part of the Firth of Forth and are dominated by the open expanse of the sea. A line of distant hills that define the northern shoreline are just visible on the horizon but lack any detail. The FEP site lies to the north west of the settlement as does Methil Docks Turbine, which is barely distinguishable.

This viewpoint has been included in the assessment as it represents potential views of the FEP site and the Development from popular beaches along the southern shores of the Firth of Forth. There is no visibility from the settlement itself due to the orientation of buildings away from the Development.

Sensitivity: This viewpoint has a *high* sensitivity due to the recreational value attached to the beaches. There are also scenic qualities in the coastal landscape seen in the view.

Magnitude of effect: The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *very small,* with the Development providing a minor influence in the wider outlook and only in clear conditions.

This is due largely to distance, the viewpoint lies over 22 km from the Development from where the Turbine will appear as an inconspicuous component of the outlook. The large-scale and strongly horizontal nature of the coastal view is also important as it provides an appropriate receiving environment for the Development, limiting uncomfortable scale comparisons. The wide expanse of the view available from here also ensures that only a very small and distant part of the full outlook will be affected.

Significance of effect: The effect on this view is judged to be *minor* and will be not significant. The Development may have some very limited effect on the outlook, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline components. This is due to the combination of factors that contribute to a very small magnitude of effect on the view.

5.25 Viewpoint 24: A198 adjoining Gosford Bay

Grid reference: E344908 N678873
Approximate distance to the development: 21.0 km
Approximate elevation: 3 m AOD
Receptor type: Road Users/Walkers
Landscape character type: Coastal Margins (East Lothian)
Landscape designation: Area of Great Landscape Value (East Lothian)
Figure: 5.15x

Baseline view: Viewpoint 24 is located on the A198 in the vicinity of Gosford Bay, at a point where the road closely follows the southern coastline of the Firth of Forth. John Muir Way long distance walking route coincides with this section of the road, as do a number of popular beaches. From here open, expansive and strongly horizontal views are obtained in the direction of the FEP site and Development. A line of distant hills that define the northern shoreline are visible on the horizon but lack any detail. Methil Docks turbine is barely discernible in the wider view.

This viewpoint represents views of the FEP site and the Development from the road and long distance walking route where they closely follow the southern shoreline of the Firth of Forth. It also represents views obtained from beaches along the southern shoreline.

Note: Other locations for this viewpoint in the vicinity of Aberlady Bay were considered, but a number of private golf courses adjoin the bay and restrict public access.

Sensitivity: Road users are usually considered to have a low sensitivity due to their transient nature. However, the coastal location of this section of the road and the scenic qualities present in the view increases sensitivity. Users of long distance walking routes and beaches are also considered to have a higher sensitivity to development. Thus, the sensitivity of the viewpoint to the Development is judged to be *high*.

Magnitude of effect: The magnitude of effect on this viewpoint as indicated by the ZTV and wireline is judged to be *very small,* with the Development providing a minor influence in the wider outlook and only in clear conditions.

This is due largely to distance, the viewpoint lies over 21 km from the Development from where the Turbine will appear as an inconspicuous component of the outlook. The large-scale and strongly horizontal nature of the coastal view is important too as it provides an appropriate receiving environment for the Development, limiting uncomfortable scale comparisons. The wide expanse of the view available from here also ensures that only a very small and distant part of the full outlook will be affected.

Significance of effect: The effect on this view is judged to be *minor* and will be not significant. The Development may have some very limited effect on the outlook, but this will not result in a material change and the prevailing characteristics of the view will continue to be defined by the baseline components. This is due to the combination of factors that contribute to a very small magnitude of effect on the view.

Appendix 7.1 - Ecology Survey Results

7 TECHNICAL APPENDIX 7.1: ECOLOGY SURVEY RESULTS

7.1 Introduction

This Technical Appendix of the Environmental Statement (ES) presents detailed baseline information from ecology surveys (including desk study and Phase 1 survey) undertaken at the proposed Development site.

7.2 Baseline Information

7.2.1 Desk Study

7.2.1.1 Fife Records Centre

Single common porpoise stranding dating from 1997 located approximately 1.1 km to the west of the Development site.

Scottish Natural Heritage (SNHi)

Grey seal dating from 1970 within the 10 km square N040 (the Development site is located within the 10 km square NT39) and a single otter record dating from 1900 within the 10 km square NO30.

7.2.1.2 Scottish Government Consultation on Seal Haul-out Sites

The Scottish Government's consultation on seal haul-out sites document contains details of potential seal haul-out sites within Scotland, taken from data supplied by the Sea Mammal Research Unit (SMRU). This document does not contain details of any potential seal haul-out sites within 10 km of the Development site. The closest potential haul-out site is Kinghorn Rocks, which is a site for common seals, located approximately 13 km to the south of the Development site.

7.2.1.3 National Biodiversity Network (NBN)

NBN provided the following records of otter within 2 km and marine mammals and notable migratory/marine fish species within 10 km (Table 7.1.1).

Table 7.1.1 NBN Data Search Results

Species	Date	Approximate Distance (km)	Location	Type of Record
Atlantic white sided dolphin	08/03/07	4.8	NT 332952	Dead stranded
Harbour porpoise	19/07/1990	8	NT 307933	Dead stranded
Harbour porpoise	17/04/1997	2	NT 350976	Dead stranded
Harbour porpoise	28/10/2004	4.2	NT 335958	Dead stranded
Harbour porpoise	26/07/2005	6	NT 321947	Dead stranded
Harbour porpoise	15/03/2006	8	NT 306932	Dead stranded
Harbour porpoise	30/04/2009	1	NT 380980	At sea
Unidentified dolphin	15/10/2000	10	NT 284917	Live stranded
Sowerby's beaked whale	7/1/2000	10	NT 284917	Dead stranded
Harbour porpoise	21/01/2006	9.7	NT 292924	Dead stranded
Grey seal	1968	-	NT 28	-
Minke whale	06/12/1999	9.2	NO 455016	Dead stranded
Grey seal	Between 1970 and 1994	-	NO 40	-
Atlantic white sided dolphin	24/9/1995	8.9	NO 4 51017	Dead stranded
Common seal	28/7/1969	8.6	NO 4501	-
Common seal	04/06/1993	6.9	NO 423026	Dead stranded
Common seal	04/06/1993	6.9	NO 423026	Dead stranded

Species	Date	Approximate Distance (km)	Location	Type of Record
Common seal	06/06/1993	6.9	NO 423026	Dead stranded
Common seal	28/06/1994	5.6	NO 408023	Dead stranded
Common seal	01/03/1996	9	NO 456006	Dead stranded
Common seal	24/06/1998	5.6	NO 409023	Dead stranded
Common seal	24/02/1999	9	NO 454011	Dead stranded
Common seal	06/02/2002	9.1	NO 456010	Live stranded
Common seal	11/11/2002	5.6	NO 409023	Dead stranded
Common seal	02/03/2003	8.8	NO 450016	Dead stranded
Common seal	17/11/2006	10	NO 467007	Dead stranded
Common seal	13/09/2008	9.7	NO 463004	Dead stranded
European eel	1796	-	NO40	-
European eel	1990	6.5	-	-
European eel	1791	-	NO 30	-
European eel	1990	-	NO 30	-
European eel	1986	2.5	-	-
European eel	1990	3	-	-
Atlantic salmon	1793	-	NO 30	-
Atlantic salmon	1990	-	NO 30	-
Atlantic salmon	1985	-	NO 30	-
Atlantic salmon	1990	2.5	-	-

7.2.2 Field Survey

7.2.2.1 Habitats

Plant species recorded during the Phase 1 survey are presented in Table 7.1.2.

Table 7.1.2 Plant Species List

Latin Name	Common Name
Agropyron repens	Couch grass
Agrostis sp.	Bent grass
Anthriscus sylvestris	Cow parsley
Artemisia vulgaris	Mugwort
Buddleja davidii	Butterfly-bush
Centaurea nigra	Common knapweed
Chamerion angustifolium	Rosebay willowherb
Chondrus crispus	Irish moss
Cirsium arvense	Creeping thistle
Cytisus scoparius	Broom
Dactylis glomerata	Cocks foot
Deschampsia caespitosa	Tufted hair grass
Fucus spiralis	Twisted wrack
Holcus lanatus	Yorkshire fog
Matricaria discoidea	Pineapple weed
Pelvetia canaliculata	Channelled wrack
Picris echioides	Bristly oxtongue
Plantago lanceolata	Ribwort plantain

Latin Name	**Common Name**
Plantago major	Greater plantain
Reseda luteola	Weld
Rubus fruticosus	Bramble
Rumex obtusifolius	Broadleaf dock
Taraxacum agg.	Dandelion
Trifolium repens	White clover
Tussilago farfara	Colt's foot
Ulex europaeus	Gorse
Urtica dioica	Common nettle

Appendix 8.1 – Ornithology

8 TECHNICAL APPENDIX 8.1: ORNITHOLOGY

This Technical Appendix presents details of the methods and results of the ornithological surveys carried out between September 2006 and September 2007 at the Development.

The following terminology is used to describe the Development and the survey/search areas:

- Development: the whole process, including construction, operation and decommissioning of the turbine and associated infrastructure (not a piece of land or an area);
- Development site: the land on which the infrastructure of the Development will be built (turbine, tracks, hard-standings, construction compound etc.); and
- Survey area: a generic term used to define an area of variable size in which the various surveys took place.

Scientific names of species referred to in this document are presented in Annex A8.1a.

8.1 Desk Study

8.1.1 Designated Sites

Information about statutory designated sites for ornithological interest was obtained from the Scottish Natural Heritage Information Service (SNHi)[1]. A radius of 5 km from the Development site was searched, except for Special Protection Areas (SPA) and Ramsar sites, for which a 20 km radius was searched.

Statutory designated sites are protected by EU and UK legislation and include:

- Special Protection Areas (SPA);
- Ramsar sites;
- Sites of Special Scientific Interest (SSSI);
- National Nature Reserves (NNR); and
- Local Nature Reserves (LNR).

Information about non-statutory designated sites and other sites for bird conservation was obtained where available within a radius of 2 km from the Development site.

Non-statutory designated sites and other sites for bird conservation include:

- Local Nature Conservation Sites (LNCS)[2];
- Royal Society for the Protection of Birds (RSPB) reserves; and
- Scottish Wildlife Trust (SWT) reserves.

Data relating to sites designated for ornithological interest are presented in Table 8.1. The location of the Development site in the context of surrounding ornithological designated sites is shown in Figure 8.1. All non-avian designated sites are discussed separately in Chapter 7: Ecology.

[1] www.snh.gov.uk/snhi

[2] Local Nature Conservation Site is a generic name for a variety of non-statutory designated sites; other common examples include: Sites of Importance for Nature Conservation (SINCs); Sites of Scientific Interest (SSI); Biological Heritage Sites (BHSs).

Table 8.1: Designated Sites for Ornithological Interest

Site Name	Designation	Site Description & Distance from Development Site	Qualifying Features
Firth of Forth	SPA	The Firth of Forth SPA/Ramsar/SSSI is a complex of estuarine and coastal habitats in south east Scotland stretching east from Alloa to the coasts of Fife and East Lothian. The site includes extensive invertebrate-rich intertidal flats and rocky shores, areas of saltmarsh, lagoons and sand dunes. The Firth of Forth SPA/Ramsar/SSSI site lies within the Development site.	The Firth of Forth SPA qualifies under Article 4.1 by regularly supporting wintering populations (1993/94-97/98 winter peak means) of European importance of the Annex 1 species: red-throated diver (90 individuals; 2% of GB), Slavonian grebe (84; 2% of NW Europe, 21% of GB), golden plover (2,949; 1% of GB) and bar-tailed godwit (1,974; 2% of Western Europe, 4% of GB). The site further qualifies under Article 4.1 by regularly supporting a post-breeding (passage) population of European importance of the Annex 1 species sandwich tern (1,617, 6% of GB, 1% of East Atlantic). The Firth of Forth SPA qualifies under Article 4.2 by regularly supporting wintering populations (1993/94-97/98 winter peak means) of both European and international importance of the migratory species pink-footed goose (10,852; 6% of Icelandic/Greenlandic), shelduck (moulting flock of 4,509; 2% of NW European), knot (9,258; 3% of western European/Canadian), redshank (4,341; 3% of European/West African) and turnstone (860 individuals; 1% of European). The Firth of Forth SPA further qualifies under Article 4.2 by regularly supporting a wintering waterfowl assemblage of European importance: a 1992/93-96/97 winter peak mean of 95,000 waterfowl, comprising 45,000 wildfowl and 50,000 waders. This assemblage includes nationally important numbers of 15 migratory species: great crested grebe (720; 7% of GB), cormorant (682; 5% of GB), scaup (437; 4% of GB), eider (9,400; 13% of GB), long-tailed duck (1,045; 4% of GB), common scoter (2,880; 8% of GB), velvet scoter (635; 21% of GB), goldeneye (3,004; 18% of GB population), red-breasted merganser (670; 7% of GB), oystercatcher (7,846; 2% of GB), ringed plover (328; 1% of GB), grey plover (724; 2% of GB), dunlin (9,514; 2% of GB), and curlew (1,928; 2% of GB). The assemblage also includes large numbers of the following species: wigeon (2,139 [1991/2-95/96]), mallard (2,564 [1991/2-95/96]) and lapwing (4,148 [1991/2-95/96]).
Firth of Forth	Ramsar	As above	Wintering populations of Slavonian grebe, pink-footed goose, shelduck, goldeneye, knot, redshank, bar-tailed godwit and turnstone. It also qualifies by supporting an internationally important post-breeding concentration of sandwich tern.
Firth of Forth	SSSI	As above	The SSSI is notified for breeding populations of eider, shelduck and ringed plover. It is also notified for wintering populations of common scoter, eider, goldeneye, great crested grebe, bar-tailed godwit, dunlin and cormorant.

Site Name	Designation	Site Description & Distance from Development Site	Qualifying Features
Forth Islands	SPA	Forth Islands SPA/SSSI consists of a series of islands supporting the main seabird colonies in the Firth of Forth. The islands of Inchmickery, Isle of May, Fidra, The Lamb, Craigleith and Bass Rock were classified on 25 April 1990. The extension to the site, classified on the 13th February 2004 consists of the island of Long Craig, which supports the largest colony of roseate tern in Scotland. It is the most northerly of only six regular British colonies. The boundary of the Special Protection Area overlaps with the boundaries of the following SSSIs: Long Craig, Inchmickery, Forth Islands, Bass Rock and the Isle of May, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface. The Forth Islands SPA/SSSI lies 15 km east of the Development site at its closest point.	Forth Islands SPA qualifies under Article 4.1 by regularly supporting populations of European importance of the Annex 1 species Arctic tern (mean between 1992 and 1996 of 540 pairs, 1.2% of the GB), roseate tern (an average of 8 pairs, 1997 - 2001; 13% of GB), common tern (an average of 334 pairs, 1997-2001; 3% of GB population) and Sandwich tern (an average of 440 pairs, 3% of GB). Forth Islands SPA further qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species; gannet (21,600 pairs, 8.2% of world biogeographic population), shag (2,400 pairs, 1.9% of N Europe biogeographic population), lesser black-backed gull (1,500 pairs, 1.2% of total *L.f. graellsii* biogeographic population) and puffin (14,000 pairs, 1.5% of total *F.a.grabae* biogeographic population). Forth Islands SPA also qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. The site regularly supports 90,000 seabirds (three year mean, 1986 – 1988) including nationally important populations of the following species: razorbill (1,400 pairs, 1.4% of GB), guillemot (16,000 pairs, 2.2% of GB), kittiwake (8,400 pairs, 1.7% of GB), herring gull (6,600 pairs, 4.1% of GB population), cormorant (200 pairs, 2.8% of GB), gannet (21,600 pairs), lesser black-backed gull (1,500 pairs), shag (2,400 pairs), puffin (14,000 pairs), fulmar (798 pairs), Arctic tern (540 pairs), common tern (334 pairs), roseate tern (8 pairs) and Sandwich tern (440 pairs).
Forth Islands	SSSI	As above	Craigleith supports the largest puffin colony in the Lothian area while Fidra and the Lamb have the only breeding great cormorant colony in the region. Fulmar, shag, razorbill and guillemot also nest on the three islands as well as great black-backed gull, lesser black-backed gull, herring gull and kittiwake. Together, these islands form the second largest seabird colony in the region.
Cameron Reservoir	SPA Ramsar SSSI	Cameron Reservoir SPA/ Ramsar/SSSI is a mesotrophic reservoir with a grassland and willow *Salix* sp. carr fringe, covering 64.4 ha in Fife, Scotland. The Cameron Reservoir SPA/Ramsar site lies 15.8 km west of the Development site.	The site qualifies under Article 4.2 of the EC Birds Directive as a SPA by regularly supporting internationally important wintering numbers of the Icelandic/Greenlandic population of pink-footed geese. During the five-winter period 1986/87 to 1990/91 an average peak of 6,760 pink-footed geese was recorded, representing over 6% of the Icelandic/Greenlandic population. It is also a Ramsar and SSSI on account of its pink-footed goose population.

Site Name	Designation	Site Description & Distance from Development Site	Qualifying Features
Loch Leven	SPA	Loch Leven SPA/Ramsar/SSSI in central Scotland is the largest natural eutrophic lake in Britain. It is a relatively shallow loch, surrounded by farmland, with a diverse aquatic flora and shoreline vegetation. The boundary of the Loch Leven SPA follows that of the Loch Leven SSSI except for the exclusion of 4 ha of SSSI towards the northern end of the loch. It is also a National Nature Reserve (NNR) Loch Leven SPA/ Ramsar/SSSI site lies 19 km west of the Development site.	Loch Leven SPA qualifies under Article 4.1 by supporting a population of European importance of wintering Icelandic whooper swan (1993/94-97/98 winter peak mean of 97 individuals, 2% of British population). Loch Leven SPA qualifies under Article 4.2 by regularly supporting populations of European importance of wintering Icelandic/Greenlandic pink-footed geese (1993/94-97/98 winter peak mean of 17,163, 8% of total population, all of which winters in Britain) and shoveler (509, 1% of NW European & 5% of GB). Loch Leven SPA further qualifies under Article 4.2 by regularly supporting a wintering waterfowl assemblage of European importance (1993/94-1997/98 winter peak mean of 34,280) which includes large populations of cormorant (391, 3% of GB) gadwall (245, 3% of GB), teal (2,771, 2% of GB), pochard (1,095, 2% of GB), tufted duck (3,636, 6% of GB) and goldeneye (339, 2% of GB).
Loch Leven	Ramsar	As above	Loch Leven is also a Ramsar site on account of its wintering population of Icelandic/Greenlandic pink-footed geese, its wintering waterfowl assemblage with a mean peak of 34,280 recorded during 1993/94-1997/98. Species include: cormorant, gadwall, teal, pochard, tufted duck and goldeneye and for its wintering population of shoveler.
Loch Leven	SSSI	As above	Loch Leven is a SSSI on account of its ornithological, botanical and entomological interest. In terms of birds it was notified due to supporting internationally important numbers of Greylag and Pink-footed Geese. It also holds nationally important wintering populations of several other species of wildfowl and has exceptionally high breeding duck numbers.

Site Name	Designation	Site Description & Distance from Development Site	Qualifying Features
Firth of Tay and Eden Estuary	SPA	The Firth of Tay & Eden Estuary SPA is a complex of estuarine and coastal habitats in eastern Scotland stretching from the mouth of the River Earn in the inner Firth of Tay east to Barry Sands on the Angus coast and St Andrews on the Fife Coast. The site includes extensive invertebrate-rich intertidal flats and areas of reedbed, saltmarsh and sand dune. The Firth of Tay and Eden Estuary SPA and Ramsar site is located 19.5 km north of the Development site.	The Firth of Tay & Eden Estuary SPA qualifies under Article 4.1 of the Birds Directive by regularly supporting nationally important breeding populations of the Annex I species marsh harrier (average of 4 females in 1992-96, 3% of GB) and little tern (average of 25 pairs between 1993 and 1997, 1% of GB); and an internationally important wintering population of the Annex I species bar-tailed godwit (2,400, 5% of GB and 2% of Western European). The SPA qualifies under Article 4.2 by regularly supporting an internationally important wintering population of redshank (1,800 individuals; 2% of GB and 1% of northwest European populations). The SPA qualifies under Article 4.2 by regularly supporting in winter over 20,000 waterfowl with a 1990/91-94/95 winter peak mean of 48,000 waterfowl, comprising 28,000 wildfowl and 20,000 waders. This assemblage includes internationally important wintering populations (1990/91-94/95 winter peak means) of pink-footed goose (2,800; 1% of GB and Icelandic/Greenlandic populations) and greylag goose (1,200; 1% of GB and Icelandic populations) and nationally important wintering populations of cormorant (230, 2% of GB), shelduck (1,200, 2% of GB), eider (13,800, 18% of GB), long-tailed duck (560, 2% of GB), common scoter (3,100; 9% of GB), velvet scoter (730, 24% of GB), goldeneye (230, 1% of GB), red-breasted merganser (470, 5% of GB), goosander (220, 2% of GB), oystercatcher (5,100, 1% of GB), grey plover (920, 2% of GB), sanderling (220, 1% of GB), dunlin (5,200, 1% of GB) and black-tailed godwit (150, 2% of GB).
Firth of Tay and Eden Estuary	Ramsar		The Firth of Tay and Eden Estuary is also a Ramsar site on account of its wintering populations of bar-tailed godwit and redshank as well as pink-footed and greylag geese.

There are no NNRs, LNRs, LNCS, SWT or RSPB sites designated for ornithological interest within 2 km of the Development site.

8.1.2 Desk Study Bird Records

8.1.2.1 Wetland Bird Survey (WeBS)

Historical bird records were requested from the British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) database. The site lies within Count Unit 85433 - East Wemyss to Leven power station.

The five year winter peak mean (post breeding peak mean for sandwich tern) WeBS counts for Count Unit 85433 (Core Count Sector) for Firth of Forth SPA species between 2006 – 2010 are presented in Table 8.2.

Table 8.2: Firth of Forth Populations and WeBS Data

Species	**Core Count Sector WeBS Data**
Pink-footed goose	Not recorded
Shelduck	Not recorded
Wigeon	Not recorded
Mallard	Not recorded
Scaup	Not recorded
Eider	525
Long-tailed duck	35
Common scoter	206
Velvet scoter	Not recorded
Goldeneye	2
Red-breasted merganser	16
Red-throated diver	1
Cormorant	66
Slavonian grebe	2
Great crested grebe	1
Oystercatcher	76
Ringed plover	Not recorded
Grey plover	4
Golden plover	Not recorded
Lapwing	Not recorded
Knot	33
Dunlin	Not recorded
Bar-tailed godwit	Not recorded
Curlew	9
Redshank	22
Turnstone	19
Sandwich tern	20

8.1.2.2 Fife Bird Recorder

Consultation was undertaken with the Fife Bird Recorder (Malcolm Ware) to determine the current status of peregrine at the Fife Energy Park. It was confirmed that the power station has been removed and consequently the pair of peregrine are no longer present.

8.2 Baseline Survey Methodology

Field methodologies are based on those described in SNH guidance[3]. Surveys were carried out over a 12 month period to account for seasonal variations in abundance of different species. Different tidal states, times of day and weather conditions were sampled across the survey period to ensure data was collected over a range of conditions. Details of the weather conditions and tidal states during each survey are presented in Annex A8.1b.

8.2.1 Vantage Point Surveys

The SNH guidance[4] has been applied to investigate bird activity around the site. Through consultation with SNH the generic guidelines were modified to ensure the data collected was most appropriate for this project. The specific methodology used is described below.

The VP method involved a surveyor being positioned on a prominent point overlooking the survey site. The VP location is indicated in Figure 8.2 (OS grid reference NT 36599 98364). From this point, the entirety of the site was visible, and the surveyor had good views of the surrounding area within 270 degrees to the north through to the west. This point was fixed and used for every VP survey of the site.

Target species included all species found on the Firth of Forth SPA/SSSI/Ramsar citations, and all waders, wildfowl, auks, terns, raptors, gannet, kittiwake and fulmar. Secondary species comprised other larids, corvids and passerines).

During each watch two hierarchical recording methods were used to record data:

- Focal Animal Sampling; and
- Activity Summary.

8.2.1.1 Focal Animal Sampling

The survey area was scanned continuously for a target species. Upon detection, the target species was tracked through the survey area until it left or landed. The path of the flight was marked on a map of the survey area, as well as the number of birds and the height at which the target species passed through the survey area. The survey area was divided into a grid comprising 18 cells (A1 – A6, B1 – B6 and C1 – 6) as illustrated on Figure 8.2. Four height bands were used to categorise altitude and each observed flight was estimated to be within one of the height bands as shown in Table 8.3. The potential collision height (PCH) where a bird is at risk of colliding with the rotors corresponds to flights within height bands 2 – 4. All flights occurring within cells B2 and C2 and at height bands 2 – 4 were classified as at-risk and for target species, these were factored into collision risk modelling as described in section 8.4 below.

Table 8.3: Focal Animal Sampling Height Bands

Height Bands			
1	2	3	4
0 – 10 m	10 – 30 m	30 – 85 m	> 85 m

8.2.1.2 Activity Summary

Prior to commencing the focal animal sampling, a census of all perched birds and those in the water within the survey area was undertaken. The activity (e.g. roosting, preening, loafing, mating or feeding) of these birds was recorded at this time. This was repeated every 30 minutes throughout the VP survey. The activity summary survey area was designed to cover the whole of the FEP site and the adjacent coastal area, and is illustrated on Figure 8.2.

[3] SNH (2005) Survey methods for use in assessing the impacts of onshore windfarms on bird communities. SNH, Battleby.
[4] Loc. op.

8.2.2 Survey Effort

Flight activity surveys were carried out at frequent intervals during the breeding and non-breeding seasons and autumn and spring migration periods and across various tidal states. A breakdown of the hours is presented below.

- Autumn migration: September to November 2006 (28 hours) and September 2007 (8 hours);
- Non-breeding season: September 2006 to February 2007 (52 hours) and September 2007 (8 hours);
- Spring migration: March to May 2007 (36 hours); and
- Breeding season: March to August 2007 (64 hours).

A monthly breakdown of survey hours per VP is presented in Table 8.4.

Table 8.4: Survey effort (2006 – 2007)

VP	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1	4	12	12	8	8	8	12	12	12	8	8	12	8

Surveys were carried out during daylight hours at various times of day throughout the year, ensuring that all times between low and high tide were sampled to account for behavioural changes that may occur during different times of day and tidal state through the breeding and non-breeding season, and migratory periods. Surveys were undertaken in a variety of weather conditions. The weather conditions were recorded during each watch. Watches usually comprised two sessions of two hours duration.

8.3 Results

8.3.1 Focal Animal Sampling

There were a total of 31 species recorded flying within the survey area. Of these, 14 target species were recorded flying at potential collision height (PCH).

A summary of species observed flying through the survey area (cells B2 and C2) is presented in Table 8.5. Details of the number of birds recorded in the four height bands in each of the survey cells B2 and C2 during each survey are presented in Annex 8.1c.

Table 8.5: Species recorded flying through survey area

Species	Number Recorded	Number at PCH	Peak Month of Flights	Conservation Status
Target species				
Teal	2	0	Oct	Amber list
Mallard	3	3	Oct & Mar	Amber list
Scaup	1	0	Nov	Schedule 1, Red list
Eider	189	11	Oct	Amber list
Long-tailed duck	15	0	Nov	Schedule 1
Common scoter	2	0	Mar & May	Schedule 1, Red list
Velvet scoter	3	2	Oct & Feb	Schedule 1, Amber list
Goldeneye	2	0	Jan & Feb	Amber list
Red-breasted merganser	20	2	Dec	Green list
Red-throated diver	3	0	Sept	Annex 1, Schedule 1, Amber list
Black-throated diver	1	0	Nov	Annex 1, Schedule 1, Amber list

Species	Number Recorded	Number at PCH	Peak Month of Flights	Conservation Status
Fulmar	10	7	May	Amber list
Manx shearwater	1	0	Oct	Amber list
Gannet	259	65	Oct	Amber list
Cormorant	400	38	Nov	Green list
Shag	269	32	Oct	Amber list
Peregrine falcon*	5	5	Nov	Annex 1/ Schedule 1
Oystercatcher	405	69	Feb	Amber list
Ringed plover	2	0	Apr	Amber list
Grey plover	1	0	Oct	Amber list
Dunlin	9	0	Sept	Red list
Curlew	9	2	Dec & Jan	Amber list
Redshank	3	0	Oct, Nov & Feb	Amber list
Kittiwake	91	69	Jun	Amber list
Sandwich tern	242	158	Aug	Annex 1, Amber list
Common tern	58	51	May	Annex 1, Amber list
Guillemot	5	0	Oct & Jul	Amber list
Razorbill	1	0	Sept	Amber List
Secondary species				
Black-headed gull	1	1	Sept	Amber list
Common gull	2	2	Mar & May	Amber list

*Although at-risk peregrine falcon flights were recorded during the surveys, these related to a pair which bred in Methil Power Station. As mentioned in section 8.1.2.2 the power station has been removed and as such, peregrine do not regularly use the area and have been excluded from collision modelling.

The majority of the target species flights, expect peregrine, were birds flying through the survey area following the coastline, up to approximately 100 m offshore. The majority of the species observed flying through the survey area were waterbirds and were commuting to and from feeding areas and/or roosting areas along the coast, feeding along the shallow waters of the coastline or on migration.

8.3.2 Activity Survey

The results of the activity survey are presented in Annex A8.1d and are summarised in this section. Annex A8.1d provides the maximum number of individuals of each species recorded in the survey area during any one survey date. These summaries provide an indication of non-flying bird activity within the survey area, particularly ducks, auks and divers which rarely left the water's surface.

The bird assemblages recorded are typical of a coastal area with moderate disturbance from industrial activities. Eiders, herring gulls and lesser black-backed gull were consistently seen during the survey period, with eiders recorded most frequently, seen in fluctuating numbers on 97% of surveys.

Notable wildfowl included goldeneye, common scoter, sandwich tern and red-throated diver. Of greatest importance in terms of the Firth of Forth SPA cited populations were numbers of cormorant (9.5% September - November of Firth of Forth SPA cited population), red-throated diver (3.3% Sep-Nov of Firth of Forth SPA cited population), long-tailed duck (2.7% Sep-Nov,

2.9% Dec-Feb and 1.7% Mar-May of Firth of Forth SPA cited population) and velvet scoter (1.1% Dec-Feb and 1.9% Mar-May of Firth of Forth SPA cited population).

Within the survey area, the sea was the most utilised area where birds rest. Eider and herring gulls were recorded in substantial numbers on the majority of the surveys, with small numbers of common scoter, goldeneye, cormorant and long-tailed duck also frequently present.

The sea wall was also regularly utilised by resting birds, including herring gull, shag and black-headed gull. The feature was found to be used by birds on every survey day; however the frequency of use by each species was low.

Rock pipit, linnet, yellow wagtail (grey wagtail)[5], pied wagtail, robin, wheatear and chiffchaff (carrion crow)[6] were the only passerines recorded using the site. These species were observed foraging on land within the survey area.

Peregrine was the only raptor found to use the site, with evidence of historic nesting at Methil Power Station, which has now been removed.

With the exception of the peregrine, no breeding birds were observed in the area around the proposed turbine. The habitats present are considered generally unsuitable for breeding birds because of the lack of suitable habitat such as trees, bushes and other tall vegetation.

8.4 Collision Risk Modelling

Collision risk modelling has been undertaken for 'at-risk' target species flights recorded during the focal animal sampling surveys. This modelling method has been developed by W. Band to estimate the number of birds colliding over a period of time. The calculation is in two stages: number of birds colliding per annum = number of birds flying through rotor swept area (Stage 1) multiplied by the probability of birds flying through rotor being hit (Stage 2).

There are two types of collision risk model:

- A regular/predictable flight method, which is used for flights which occur in broadly the same direction, such as birds on passage or commuting; and
- An irregular/randomised method, which is used for flights which are not predictable, such as hunting raptors.

As agreed with SNH, the 'Regular Flights through a Wind Farm' Stage 1 method was applied to all target species, except raptors[7].

8.4.1 Stage 1: Number of birds flying through rotors

To estimate the collision risk for each species recorded, the flights that pass through the 'risk window' of the turbine must be identified. The risk window is a rectangular area in the vertical plane perpendicular to the main direction of movement of flying birds. In this case the size of the risk window has been defined as 371.2 m (rotor diameter of 171.2 m plus 100 m buffer either side) multiplied by 171.2 m (rotor diameter) which equals 63549.44 m². Birds flying at height bands 2, 3 and 4 that were recorded within this risk window of the survey area were assessed for their collision risk.

Once the number of birds observed flying through the risk window has been calculated from the observed data, a scaling factor was applied to the numbers to account for the potential number that would be flying through the risk window during a whole year. No guidance exists on how to calculate the scaling factor, however, SNH have recommended in the past that factors are derived based on the ecology of each species surveyed. Therefore, the following two approaches were developed for the species encountered during the surveys.

[5] One record of a bird "flitting about" in the survey area in November. As yellow wagtails are summer migrants, it suspected that this was a misidentified grey wagtail.
[6] Several records of one or two birds, mainly in the winter. This species is unlikely to winter at this location; it is suspected that the species code recorded on the field recording sheets (CC) refers to carrion crow (C.).
[7] Peregrine falcon was the only raptor species recorded during the surveys. Update collision risk modelling has not been undertaken for this species as it no longer breeds at the development site.

For species considered to be predominantly diurnal, the active period was assumed to be during daylight hours. The amount of daylight available within each month was estimated and aggregated into the winter period (September – February) and the summer period (March – August), and the whole year. This allowed a factor to be applied to the surveyed number of movements to calculate a predicted number of total movements during the seasonal period the species is likely to be present. The factors used are given in Table 8.6 and were applied to all non-wading species.

Table 8.6: Scaling Factors for Predominantly Diurnal Species

Season	Total light (days)	Total light (hrs)	Survey Effort (hrs)	Scaling Factor
Winter species	71.6	1719.5	60	28.7
Summer species	111.2	2668	64	41.7
Whole year species	182.8	4387.5	124	35.4

Certain species, particularly waders, are predominantly regulated by tidal cycles and hence require a different correction factor since the surveys would have sampled both active and inactive periods. The factors used to calculate a predicted number of total movements for tidal regulated species (i.e. all waders) for the winter period (Sept – Mar) and the summer period (Apr – Aug), and the whole year are given in Table 8.7.

Table 8.7: Scaling Factors for Predominantly Tidal Regulated Species

Season	Total Time (days)	Total Time (hrs)	Survey Effort (hrs)	Scaling Factor
Winter species	90.5	2172	60	36.2
Summer species	92	2280	64	35.6
Whole year species	182.5	4452	124	35.9

The observed numbers of flights during the various month of the survey were adjusted using the appropriate scaling factor. Next the area swept by the wind farm rotors was calculated. In this case, the area is calculated for just one turbine based on a radius of 85.6 m. The total rotor swept area was then expressed as a proportion of the area of the risk window and used to calculate the number of birds passing through the rotors by multiplying it by the total scaled number of birds through the risk window. An example of the Stage 1 model is shown in Annex A8.1e (a worked example for Oystercatcher).

8.4.2 Stage 2: Probability of bird being hit when flying through the rotor

This stage computes the probability of a bird being hit when making a transit through a rotor. The probability depends on the size of the bird (both length and wingspan), the breadth and pitch of the turbine blades, the rotation speed of the turbine, and the flight speed of the bird.

An example of the worksheet used for Stage 2 of the model is shown in Annex A8.1e. Various turbine and bird parameters are required for Stage 2 of the model. The parameters of the turbine used in the assessment are provided in Table 8.8 and species biometric data are provided in Table 8.9 with reference to their source.

Table 8.8: Turbine Parameters

Item	Value
Number of Blades	3
Maximum Chord	5.75 m
Total Turbine Height	195.6 m
Hub Height	110 m
Pitch (degrees)	20
Rotor Diameter	171.2 m
Rotation Period	5 secs

Table 8.9: Species Biometric Data

Species	Length (m)*	Wingspan (m)*	Flight Speed (m/s)	Flight Speed Source
Mallard	0.58	0.90	18.5	Bruderer & Boldt 2001[8]
Eider	0.60	0.94	17.9	Bruderer & Boldt 2001[9]
Velvet scoter	0.54	0.94	20.1	Bruderer & Boldt 2001[10]
Red-breasted merganser	0.55	0.78	20	Bruderer & Boldt 2001
Fulmar	0.48	1.07	11.26	Spear & Ainley 1997[11]
Gannet	0.94	1.72	16.22	Garthe et al. 2007[12]
Cormorant	0.90	1.45	15.9	Spear & Ainley 1997[13]
Shag	0.72	0.98	15.9	Spear & Ainley 1997[14]
Oystercatcher	0.42	0.83	16.67	Bruderer & Boldt 2001[15]
Curlew	0.55	0.90	16.3	Bruderer & Boldt 2001[16]
Kittiwake	0.39	1.08	16.7	Oldén & Peterz 1985[17]
Common tern	0.33	0.88	9.8	Becker et al. (1993)[18]
Sandwich tern	0.38	1.00	11.9	Wakeling & Hodgson (1992)[19]

* All references for Bird Length and Wingspan came from the BTO website[20].

The swept area of the rotors would be between 24.4 m – 195.6 m from sea level. A summary of the height bands used during the field surveys are shown in Table 8.3. Therefore all flights within height bands 2, 3 and 4 were considered to be at risk height and were included in the collision risk models.

A theoretical no-avoidance collision risk was then calculated using the 'Band' model as described in the guidance produced by SNH and the parameters described above. The theoretical number of collisions was derived by multiplying the total number of movements through the swept area of the turbine in a season by the probability of being struck by the moving rotor. The collision result is accepted to be a gross over-estimation since it does not take into account the avoiding action which would be taken by many individuals. In order to calculate an actual estimate of collision risk using the 'Band' model, an avoidance rate must

[8] Loc. op.
[9] Loc. op.
[10] Loc. op.
[11] Spear, L. B. and Ainley, D. G. (1997) Flight speed of seabirds in relation to wind speed and direction. Ibis, 139: 234–251. doi: 10.1111/j.1474-919X.1997.tb04621.x
[12] Garthe S., Montevecchi, W.A. and Davoren, G. (2007) Flight destinations and foraging behaviour of northern gannets (*Sula bassana*) preying on a small foraging fish in a Low Arctic ecosystem. Deep Sea Res Part II 54:311–320
[13] Loc. op.
[14] Loc. op.
[15] Bruderer, B., and Boldt, A. (2001) Flight characteristics of birds: I. radar measurements of speeds. Ibis 143: 178-204.
[16] Loc. op.
[17] Oldén B. and Peterz M. (1985) A statistical methof for determination of flight speed of migrating birds. J. Field Ornithol., 56(1):17-22.
[18] Becker, P. H., D. Frank, and S. Sudmann. (1993) Temporal and spatial pattern of Common Tern (*Sterna hirundo*) foraging in the Wadden Sea. Oecologia 93: 389–393.
[19] Wakeling, J.M. and Hodgson, J. (1992) Optimisation of the flight speed of the little, common, and sandwich tern. J. exp. Biol. 169,
[20] www.bto.org.uk/birdfacts

be applied to the results. Species avoidance rates have been taken from SNH guidance[21]. Where a species avoidance rate is not available, the default rate of 98 % has been used. Table 8.10 shows the annual collision risk for each species.

Table 8.10: Collision Risk Per Species Per Annum

Species	No. of at-risk flights	Scaling factor	Avoidance Rate	Collision Risk
Mallard	3	35.4	98 %	0.05
Eider	11	35.4	98 %	0.19
Velvet scoter	2	28.7	98 %	0.03
Red-breasted merganser	2	28.7	98 %	0.03
Fulmar	7	41.7	98 %	0.19
Gannet	65	41.7	98 %	1.69
Cormorant	38	35.4	98 %	0.83
Shag	32	35.4	98 %	0.64
Oystercatcher	69	35.9	98 %	1.16
Curlew	2	35.9	98 %	0.04
Kittiwake	69	41.7	98 %	1.34
Sandwich tern	158	41.7	98 %	3.89
Common tern	51	41.7	98 %	1.43

[21] SNH (2010) Use of avoidance rates in the SNH wind farm collision risk model. SNH avoidance rate information and guidance note. SNH, Lochgilphead.

ANNEX A8.1A: SCIENTIFIC NAMES FOR SPECIES LISTED IN THIS REPORT

Common name	Latin name
Whooper swan	*Cygnus cygnus*
Pink-footed goose	*Anser brachyrhynchus*
Greylag goose	*Anser anser*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas penelope*
Gadwall	*Anas strepera*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Shoveler	*Anas clypeata*
Pochard	*Aythya ferina*
Tufted duck	*Aythya fuligula*
Scaup	*Aythya marila*
Eider	*Somateria mollissima*
Long-tailed duck	*Clangula hyemalis*
Common scoter	*Melanitta nigra*
Velvet scoter	*Melanitta fusca*
Goldeneye	*Bucephala clangula*
Red-breasted merganser	*Mergus serrator*
Red-throated diver	*Gavia stellata*
Black-throated diver	*Gavia arctica*
Fulmar	*Fulmarus glacialis*
Manx shearwater	*Puffinus puffinus*
Gannet	*Morus bassanus*
Cormorant	*Phalacrocorax carbo*
Shag	*Phalacrocorax aristotelis*
Grey heron	*Ardea cinerea*
Slavonian grebe	*Podiceps auritus*
Great crested grebe	*Podiceps cristatus*
Marsh harrier	*Circus aeruginosus*
Peregrine	*Falco peregrinus*
Oystercatcher	*Haematopus ostralegus*
Ringed plover	*Charadrius hiaticula*
Golden plover	*Pluvialis apricaria*
Grey plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Knot	*Calidris canutus*
Sanderling	*Calidris alba*

Common name	**Latin name**
Dunlin	*Calidris alpina*
Black-tailed godwit	*Limosa limosa*
Bar-tailed godwit	*Limosa lapponica*
Curlew	*Numenius arquata*
Common sandpiper	*Actitis hypoleucos*
Redshank	*Tringa totanus*
Turnstone	*Arenaria interpres*
Kittiwake	*Rissa tridactyla*
Black-headed gull	*Chroicocephalus ridibundus*
Lesser black-backed gull	*Larus fuscus*
Herring gull	*Larus argentatus*
Great black-backed gull	*Larus marinus*
Common gull	*Larus canus*
Sandwich tern	*Sterna sandvicensis*
Arctic tern	*Sterna paradisaea*
Roseate tern	*Sterna dougallii*
Common tern	*Sterna hirundo*
Little tern	*Sternula albifrons*
Guillemot	*Uria aalge*
Razorbill	*Alca torda*
Puffin	*Fratercula arctica*
Woodpigeon	*Columba palumbus*
Carrion crow	*Corvus corone*
Swallow	*Hirundo rustica*
Chiffchaff	*Phylloscopus collybita*
Robin	*Erithacus rubecula*
Wheatear	*Oenanthe oenanthe*
Yellow wagtail	*Motacilla flava*
Pied wagtail	*Motacilla alba*
Grey wagtail	*Motacilla cinerea*
Rock pipit	*Anthus petrosus*
Linnet	*Carduelis cannabina*

ANNEX A8.1B: TIMING AND WEATHER CONDITIONS DURING FLIGHT ACTIVITY SURVEY

Date	Start Time	End Time	Low Tide Time	Tidal State	Wind direction	Wind speed	Rain
28/09/2006	11:20	13:20	10:48	Low-Mid	S	moderate	0
28/09/2006	13:30	15:30	10:48	Mid	S	moderate	0
11/10/2006	10:00	12:00	10:45	Low	E	moderate	0
11/10/2006	12:15	14:15	10:45	Mid	E	moderate	0
18/10/2006	08:45	10:45	06:13	Mid	SW	calm	0
18/10/2006	12:00	14:00	06:13	High	SW	calm	0
25/10/2006	09:00	11:00	09:30	Low	N	calm	0
25/10/2006	11:30	13:30	09:30	Mid	S	slight	0
01/11/2006	09:30	11:30	04:22	High	SW	calm	0
01/11/2006	12:45	14:45	04:22	Mid	SW	slight	0
15/11/2006	09:40	11:40	04:38	High	n/a	no wind	1
15/11/2006	14:05	16:05	04:38	Mid-Low	n/a	wind	2
30/11/2006	09:30	11:30	04:00	High	SW	very strong wind	0
30/11/2006	11:45	13:45	04:00	Mid	SW	very strong wind	0
05/12/2006	08:45	10:45	08:00	Low -Mid	SW	slight	0
05/12/2006	12:00	14:00	08:00	Mid - High	SW	slight/ moderate	0
21/12/2006	08:30	10:30	08:31	Low	W	slight	0
21/12/2006	11:30	13:30	08:31	Mid-High	SW	moderate - fresh	0
06/01/2007	10:15	12:15	10:00	Low	SW	slight	0
06/01/2007	13:20	15:20	10:00	Mid	S	moderate	0
27/01/2007	11:15	13:15	14:29	Mid-Low	SW	slight	0
27/01/2007	14:10	16:10	14:29	Low	WSW	fresh breeze	0
06/02/2007	11:30	13:30	10:36	Low-Mid	W	slight	0
06/02/2007	14:45	16:45	10:36	Mid-High	W	slight	0
19/02/2007	07:50	09:50	09:29	Low	SE	moderate	0
19/02/2007	10:30	12:30	09:29	Mid	SE	slight	0
11/03/2007	11:00	13:00	11:52	Low	SW	moderate	0
11/03/2007	13:00	15:00	11:52	Low-Mid	SW	slight	0
22/03/2007	10:30	12:30	10:08	Low	NE	moderate	0
22/03/2007	13:30	15:30	10:08	Mid-High	E	moderate	0
28/03/2007	09:30	11:30	04:56	Mid-High	SE	slight	0
28/03/2007	11:30	13:30	04:56	High-Mid	SE	slight	0
03/04/2007	11:00	13:00	09:44	Mid	NE	slight	0
03/04/2007	13:00	15:00	09:44	Mid-High	NE	slight	0

Date	Start Time	End Time	Low Tide Time	Tidal State	Wind direction	Wind speed	Rain
18/04/2007	08:45	10:45	08:44	Low	W	moderate	0
18/04/2007	11:00	13:00	08:44	Mid	SW	slight	0
24/04/2007	11:00	13:00	14:55	Mid	SE	slight	0
24/04/2007	13:10	15:10	14:55	Mid-Low	SW	gentle	0
08/05/2007	12:45	14:45	12:24	Low	W	slight	3
08/05/2007	14:45	16:45	12:24	Mid	W	slight	3
15/05/2007	10:20	12:20	07:24	Mid-High	E	slight	0
15/05/2007	12:45	14:45	07:24	High	E	slight	0
30/05/2007	10:00	12:00	07:30	Mid-High	NW	slight	3
30/05/2007	12:00	14:00	07:30	High	NW	moderate	3
11/06/2007	12:20	14:20	17:56	High-Mid	n/a	calm	0
11/06/2007	14:20	16:20	17:56	Mid	SW	light air	0
28/06/2007	14:30	16:30	18:56	Mid	W	moderate	0
28/06/2007	16:30	18:30	18:56	Mid-Low	W	strong	1
09/07/2007	16:00	18:00	16:00	Low	SW	slight	0
10/07/2007	10:00	12:00	17:04	High	SW	slight	0
23/07/2007	14:15	16:15	15:13	Low	S	strong	0
23/07/2007	16:15	18:15	15:13	Low-Mid	S	strong	0
07/08/2007	10:30	12:30	15:48	Mid	SW	moderate	0
07/08/2007	13:00	15:00	15:48	Mid-Low	SW	moderate	0
23/08/2007	10:00	12:00	17:03	High	SW	slight	0
23/08/2007	12:00	14:00	17:03	High-Mid	SW	slight	0
30/08/2007	13:15	15:15	09:31	Mid-High	W	slight	0
30/08/2007	15:15	17:15	09:31	High-Mid	W	slight	1
11/09/2007	10:00	12:00	09:25	Low-Mid	NE	slight	0
11/09/2007	12:10	14:10	09:25	Mid-High	NE	slight	0
18/09/2007	10:00	12:00	12:20	Mid-Low	NW	moderate	0
18/09/2007	13:00	15:00	12:20	Low-Mid	NW	moderate	0

ANNEX A8.1C: DETAILED RESULTS OF FLIGHT ACTIVITY SURVEYS

The tables provide the number of birds observed at each height band (1 is below PCH; 2, 3 and 4 are at PCH) during each two-hour watch in cells B2 and C2. Some birds were recorded in both cells B2 and C2; the raw data were examined to identify these and totals have been adjusted to avoid double-counting. The final table provides the total number of flights throughout the survey period crossing the survey area in the four different height bands.

Species	**28/09/2006**																			
	Low-Mid tide								**Mid tide**								**Low tide: 10:48**			
	11:20-13:20								**13:30-15:30**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Black-headed gull																				
Black-throated diver																				
Common guillemot					1												1			
Common gull																				
Common scoter																				
Common tern																				
Cormorant																				
Curlew					1												1			
Dunlin					5												5			
Eider					2								1	2			3	2		
Gannet						1							2	3			2	4		
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				

Species	28/09/2006																			
	Low-Mid tide								Mid tide								Low tide: 10:48			
	11:20-13:20								13:30-15:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Mallard																				
Oystercatcher					1	2								47			1	49		
Razorbill					1												1			
Red-breasted merganser																				
Redshank																				
Red-throated diver					2												2			
Ringed plover																				
Sandwich tern					12	5							2	13			14	18		
Scaup																				
Shag																				
Teal																				
Velvet scoter																				

Species	11/10/2006																			
	Low tide								Mid tide								Low tide: 10:45			
	10:00-12:00								12:15-14:15								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot													2				2			
Common gull																				
Common scoter																				
Common tern																				
Cormorant					20					1			1	1			21	1		
Curlew					1												1			
Dunlin																				
Eider					28								4	6			32	6		
Gannet	11				74	26	17						114	7			188	33	17	
Goldeneye																				
Grey plover					1												1			
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher	2				6					2			8	1			14	3		
Razorbill																				
Red-breasted merganser																				

Species	**11/10/2006**																			
	Low tide								**Mid tide**								**Low tide: 10:45**			
	10:00-12:00								**12:15-14:15**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank	1																1			
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					14	3			1				15	2			30	5		
Teal																				
Velvet scoter																				
Manx Shearwater					1												1			

Species	18/10/2006																			
	Mid tide								High tide								Low tide: 06:13			
	08:45-10:45								12:00-14:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					6								13				19			
Curlew																				
Dunlin																				
Eider					20	2							10	1			30	3		
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					16								1				17			
Razorbill																				
Red-breasted merganser																				

Species	18/10/2006																			
	Mid tide								High tide								Low tide: 06:13			
	08:45-10:45								12:00-14:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					19								22	1			41	1		
Teal													2				2			
Velvet scoter																				

Species	25/10/2006																			
	Low tide								Mid tide								Low tide: 09:30			
	09:00-11:00								11:30-13:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant	1				7				3				14	1			20	1		
Curlew																				
Dunlin																				
Eider					9								5				14			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard											1				1				1	
Oystercatcher					6	1			10				17				23	1		
Razorbill																				
Red-breasted merganser																				

Species	25/10/2006																			
	Low tide								Mid tide								Low tide: 09:30			
	09:00-11:00								11:30-13:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					11				1				4				15			
Teal																				
Velvet scoter														1	1			1	1	

Species	01/11/2006																			
	High tide								Mid tide								Low tide: 04:22			
	09:30-11:30								12:45-14:45								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					20	3							22				42	3		
Curlew																				
Dunlin																				
Eider					2								4				6			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck					3								2				5			
Mallard																				
Oystercatcher					2								2				4			
Razorbill																				
Red-breasted merganser																				

Species	01/11/2006																			
	High tide								Mid tide								Low tide: 04:22			
	09:30-11:30								12:45-14:45								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank					1												1			
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup													1				1			
Shag					21								5				26			
Teal																				
Velvet scoter													1				1			
Peregrine										1				1				2		

Species	15/11/2006																			
	High tide								Mid-Low tide								Low tide: 04:38			
	09:40-11:40								14:05-16:05								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver													1							
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					8								1							
Curlew																				
Dunlin																				
Eider																				
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher													1							
Razorbill																				
Red-breasted merganser																				

Species	**15/11/2006**																			
	High tide								**Mid-Low tide**								**Low tide: 04:38**			
	09:40-11:40								**14:05-16:05**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag		1			20								6							
Teal																				
Velvet scoter																				
Peregrine		1				1												1		

Species	30/11/2006																			
	High tide								Mid tide								Low tide: 04:00			
	09:30-11:30								11:45-13:45								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					9	2				2			5	2			14	6		
Curlew																				
Dunlin																				
Eider					3								3				6			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					1					4			1	4			2	4		
Razorbill																				
Red-breasted merganser																				

Species	**30/11/2006**																			
	High tide								**Mid tide**								**Low tide: 04:00**			
	09:30-11:30								**11:45-13:45**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					1	1							1				2	1		
Teal																				
Velvet scoter																				

Species	05/12/2006																			
	Low-Mid tide								Mid-High tide								Low tide: 08:00			
	08:45-10:45								12:00-14:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					12					1			11	2	1		23	2	1	
Curlew						1												1		
Dunlin																				
Eider					6								1				7			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					13								2				15			
Razorbill																				
Red-breasted merganser					5								1				6			

Species	**05/12/2006**																			
	Low-Mid tide								**Mid-High tide**								**Low tide: 08:00**			
	08:45-10:45								**12:00-14:00**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					10								6				16			
Teal																				
Velvet scoter																				

Species	21/12/2006																			
	Low tide								Mid-High tide								Low tide: 08:31			
	08:30-10:30								11:30-13:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					16	3							12	4			28	7		
Curlew					1												1			
Dunlin																				
Eider					3								5				8			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck					3								1				4			
Mallard																				
Oystercatcher					7	1							2				9	1		
Razorbill																				
Red-breasted merganser														2				2		

Species	21/12/2006																			
	Low tide								Mid-High tide								Low tide: 08:31			
	08:30-10:30								11:30-13:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					6								2				8			
Teal																				
Velvet scoter																				

Species	06/01/2007																			
	Low tide								Mid tide								Low tide: 10:00			
	10:15-12:15								13:20-15:20								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					17	2							13	2			30	4		
Curlew					2												2			
Dunlin																				
Eider					3												3			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					5	1							17				22	1		
Razorbill																				
Red-breasted merganser																				

Species	06/01/2007																			
	Low tide								Mid tide								Low tide: 10:00			
	10:15-12:15								13:20-15:20								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag	1																1			
Teal																				
Velvet scoter																				

Species	27/01/2007																			
	Mid-Low tide								Low tide								Low tide: 14:29			
	11:15-13:15								14:10-16:10								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					7								5				12			
Curlew																				
Dunlin																				
Eider																				
Gannet																				
Goldeneye					1												1			
Grey plover																				
Kittiwake																				
Long-tailed duck					2												2			
Mallard																				
Oystercatcher					2												2			
Razorbill																				
Red-breasted merganser																				

Species	**27/01/2007**																			
	Mid-Low tide								**Low tide**								**Low tide: 14:29**			
	11:15-13:15								**14:10-16:10**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					1												1			
Teal																				
Velvet scoter																				

Species	06/02/2007																			
	Low-Mid tide								Mid-High tide								Low tide: 10:36			
	11:30-13:30								14.45-16.45								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					14								14				28			
Curlew																				
Dunlin																				
Eider					3								4				7			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					23								90				113			
Razorbill																				
Red-breasted merganser													2				2			

Species	06/02/2007																			
	Low-Mid tide								Mid-High tide								Low tide: 10:36			
	11:30-13:30								14.45-16.45								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank													1				1			
Red-throated diver													1				1			
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					4								2				6			
Teal																				
Velvet scoter																				

Species	19/02/2007																			
	Low tide								Mid tide								Low tide: 09:29			
	07:50-09:50								10:30-12:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					8								5	1			13	1		
Curlew																				
Dunlin																				
Eider					10								4				14			
Gannet																				
Goldeneye					1												1			
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					4								19	1			23	1		
Razorbill																				
Red-breasted merganser					2												2			

Species	19/02/2007																			
	Low tide								Mid tide								Low tide: 09:29			
	07:50-09:50								10:30-12:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag																				
Teal																				
Velvet scoter					2												2			

Species	11/03/2007																			
	Low tide								Low-Mid tide								Low tide: 11:52			
	11:00-13:00								13:00-15:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					1								1				2			
Curlew																				
Dunlin																				
Eider					1								1				2			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard						2												2		
Oystercatcher					1									1	1		1	1	1	
Razorbill																				
Red-breasted merganser																				

Species	**11/03/2007**																			
	Low tide								**Low-Mid tide**								**Low tide: 11:52**			
	11:00-13:00								**13:00-15:00**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					1								1				2			
Teal																				
Velvet scoter																				

Species	22/03/2007																			
	Low tide								Mid-High tide								Low tide: 10:08			
	10:30-12:30								13:30-15:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter													1				1			
Common tern																				
Cormorant					2								6				8			
Curlew																				
Dunlin																				
Eider					2								3				5			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck					1												1			
Mallard																				
Oystercatcher													24				24			
Razorbill																				
Red-breasted merganser					2												2			

Species	**22/03/2007**																			
	Low tide								**Mid-High tide**								**Low tide: 10:08**			
	10:30-12:30								**13:30-15:30**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag																				
Teal																				
Velvet scoter																				

Species	28/03/2007																			
	Mid-High tide								High-Mid tide								Low tide: 04:56			
	09:30-11:30								11:30-13:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					6								5				11			
Curlew																				
Dunlin																				
Eider					4												4			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher																				
Razorbill																				
Red-breasted merganser																				

Species	**28/03/2007**																			
	Mid-High tide								**High-Mid tide**								**Low tide: 04:56**			
	09:30-11:30								**11:30-13:30**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag																				
Teal																				
Velvet scoter																				
Fulmar	1																1			

Species	03/04/2007																			
	Mid tide								Mid-High tide								Low tide: 09:44			
	11:00-13:00								13:00-15:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					11								2				13			
Curlew																				
Dunlin																				
Eider					9								2				11			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck					3												3			
Mallard																				
Oystercatcher					4								16				20			
Razorbill																				
Red-breasted merganser					4												4			

Species	03/04/2007																			
	Mid tide								Mid-High tide								Low tide: 09:44			
	11:00-13:00								13:00-15:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag													2				2			
Teal																				
Velvet scoter																				
Fulmar							1												1	
Peregrine															1				1	

Species	18/04/2007																			
	Low tide								Mid-High tide								Low tide: 08:44			
	08:45-10:45								11:00-13:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					7								10	2			17	2		
Curlew													1				1			
Dunlin																				
Eider					4								3				7			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					2												2			
Razorbill																				
Red-breasted merganser																				

Species	18/04/2007																			
	Low tide								Mid-High tide								Low tide: 08:44			
	08:45-10:45								11:00-13:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					3								1				4			
Teal																				
Velvet scoter																				
Fulmar														1				1		
Peregrine															1				1	

Species	24/04/2007																			
	Mid tide								Mid-Low tide								Low tide: 14:55			
	11:00-13:00								13:10-15:10								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant													2				2			
Curlew																				
Dunlin																				
Eider					3								5				8			
Gannet							2												2	
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher					2								1			1	3			1
Razorbill																				
Red-breasted merganser													2				2			

Species	**24/04/2007**																			
	Mid tide								**Mid-Low tide**								**Low tide: 14:55**			
	11:00-13:00								**13:10-15:10**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover													2				2			
Sandwich tern																				
Scaup																				
Shag					1												1			
Teal																				
Velvet scoter																				

Species	08/05/2007																			
	Low tide								Mid tide								Low tide: 12:24			
	12:45-14:45								14:45-16:45								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern						3												3		
Cormorant													1				1			
Curlew																				
Dunlin																				
Eider																				
Gannet													1	1			1	1		
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher																				
Razorbill																				
Red-breasted merganser																				

Species	**08/05/2007**																			
	Low tide								**Mid tide**								**Low tide: 12:24**			
	12:45-14:45								**14:45-16:45**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag																				
Teal																				
Velvet scoter																				

Species	15/05/2007																			
	Mid-High tide								High tide								Low tide: 07:24			
	10:20-12:20								12:45-14:45								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter					1												1			
Common tern						9				7				16				25		
Cormorant									2				4		1		4		1	
Curlew																				
Dunlin													4				4			
Eider																				
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake									1	1			1	1			1	1		
Long-tailed duck																				
Mallard																				
Oystercatcher					10												10			
Razorbill																				
Red-breasted merganser																				

Species	**15/05/2007**																			
	Mid-High tide								**High tide**								**Low tide: 07:24**			
	10:20-12:20								**12:45-14:45**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					7				3				3		1		10		1	
Teal																				
Velvet scoter																				
Fulmar						1			1				1				1	1		

Species	30/05/2007																			
	Mid-High tide								High tide								Low tide: 07:30			
	10:00-12:00								12:00-14:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					5	1							4				9	1		
Curlew																				
Dunlin																				
Eider					1												1			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher																				
Razorbill																				
Red-breasted merganser																				

Species	**30/05/2007**																			
	Mid-High tide								**High tide**								**Low tide: 07:30**			
	10:00-12:00								**12:00-14:00**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern																				
Scaup																				
Shag					4								5				9			
Teal																				
Velvet scoter																				
Fulmar													1				1			

Species	11/06/2007																			
	High-Mid tide								Mid tide								Low tide: 17:56			
	12:20-14:20								14:20-16:20								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					5								7	1			12	1		
Curlew																				
Dunlin																				
Eider					1								7				8			
Gannet															1				1	
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher							1						9				9		1	
Razorbill																				
Red-breasted merganser																				

Species	11/06/2007																			
	High-Mid tide								Mid tide								Low tide: 17:56			
	12:20-14:20								14:20-16:20								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern														2				2		
Scaup																				
Shag					3								2				5			
Teal																				
Velvet scoter																				
Fulmar			1				1							1				1	1	

Species	28/06/2007																			
	Mid tide								Mid-Low tide								Low tide: 18:56			
	14:30-16:30								16:30-18:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					2	1							5		1		7	1	1	
Curlew													1				1			
Dunlin																				
Eider													1				1			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake					8	49	5						2				10	49	5	
Long-tailed duck																				
Mallard																				
Oystercatcher					1							3	9			3	10			3
Razorbill																				
Red-breasted merganser																				

Species	28/06/2007																			
	Mid tide								Mid-Low tide								Low tide: 18:56			
	14:30-16:30								16:30-18:30								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern		1				1												1		
Scaup																				
Shag														1				1		
Teal																				
Velvet scoter																				
Fulmar			1																1	

Species	09-10/07/2007																			
	Low tide								High tide								Low tide: 16:00 17:04			
	16:00-18:00								10:00-12:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot					2												2			
Common gull																				
Common scoter																				
Common tern						2		1					2	1			2	3		1
Cormorant																				
Curlew																				
Dunlin																				
Eider																				
Gannet														2				2		
Goldeneye																				
Grey plover																				
Kittiwake						2							4	2	1		4	4	1	
Long-tailed duck																				
Mallard																				
Oystercatcher																				
Razorbill																				

Species	09-10/07/2007																			
	Low tide								High tide								Low tide: 16:00 17:04			
	16:00-18:00								10:00-12:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Red-breasted merganser																				
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern					3	6							8	14	11		11	20	11	
Scaup																				
Shag																				
Teal																				
Velvet scoter																				
Fulmar		1																1		

Species	23/07/2007																			
	Low tide								Low-Mid tide								Low tide: 15:13			
	14:15-16:15								16:15-18:15								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull						2												2		
Common scoter																				
Common tern																				
Cormorant					1									1			1	1		
Curlew																				
Dunlin																				
Eider																				
Gannet					2	3							1	1			3	4		
Goldeneye																				
Grey plover																				
Kittiwake	1	2			3	2							1				4	4		
Long-tailed duck																				
Mallard																				
Oystercatcher					1	1							1				2	1		
Razorbill																				
Red-breasted merganser																				

Species	23/07/2007																			
	Low tide								Low-Mid tide								Low tide: 15:13			
	14:15-16:15								16:15-18:15								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern					6	6							9	2			15	8		
Scaup																				
Shag					7	2							2				9	2		
Teal																				
Velvet scoter																				

Species	07/08/2007																			
	Mid tide								Mid-Low tide								Low tide: 15:48			
	10:30-12:30								13:00-15:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern					5												5			
Cormorant					1												1			
Curlew																				
Dunlin																				
Eider																				
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher																				
Razorbill																				
Red-breasted merganser																				

Species	**07/08/2007**																			
	Mid tide								**Mid-Low tide**								**Low tide: 15:48**			
	10:30-12:30								**13:00-15:00**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern					14												14			
Scaup																				
Shag																				
Teal																				
Velvet scoter																				

Species	23/08/2007																			
	High tide								High-Mid tide								Low tide: 17:03			
	10:00-12:00								12:00-14:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern						1	4											1	4	
Cormorant													1				1			
Curlew						1												1		
Dunlin																				
Eider																				
Gannet						1												1		
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher													2				2			
Razorbill																				
Red-breasted merganser																				

Species	23/08/2007																			
	High tide								High-Mid tide								Low tide: 17:03			
	10:00-12:00								12:00-14:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern					3	40							3	31			6	71		
Scaup																				
Shag		1			10								9	11			19	12		
Teal																				
Velvet scoter																				

Species	30/08/2007																			
	Mid-High tide								High-Mid tide								Low tide: 09:31			
	13:15-15:15								15:15-17:15								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					7	3							4				11	3		
Curlew																				
Dunlin																				
Eider																				
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake					1	3								1			1	4		
Long-tailed duck																				
Mallard																				
Oystercatcher					1								5				6			
Razorbill																				
Red-breasted merganser																				

Species	**30/08/2007**																			
	Mid-High tide								**High-Mid tide**								**Low tide: 09:31**			
	13:15-15:15								**15:15-17:15**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern					5									2			5	2		
Scaup																				
Shag					2								2				4			
Teal																				
Velvet scoter																				

Species	11/09/2007																			
	Low-Mid tide								Mid-High tide								Low tide: 09:25			
	10:00-12:00								12:10-14:10								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull							1												1	
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern																				
Cormorant					1		1						2				3		1	
Curlew																				
Dunlin																				
Eider																				
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake																				
Long-tailed duck																				
Mallard																				
Oystercatcher						1												1		
Razorbill																				
Red-breasted merganser																				

Species	**11/09/2007**																			
	Low-Mid tide								**Mid-High tide**								**Low tide: 09:25**			
	10:00-12:00								**12:10-14:10**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern														6				6		
Scaup																				
Shag						7	1											7	1	
Teal																				
Velvet scoter																				

Species	18/09/2007																			
	Mid-Low tide								Low-Mid tide								Low tide: 12:20			
	10:00-12:00								13:00-15:00								TOTAL			
	B2				C2				B2				C2				Both cells			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Black-headed gull																				
Black-throated diver																				
Common guillemot																				
Common gull																				
Common scoter																				
Common tern						14												14		
Cormorant																				
Curlew																				
Dunlin																				
Eider													1				1			
Gannet																				
Goldeneye																				
Grey plover																				
Kittiwake					1								1	1			2	1		
Long-tailed duck																				
Mallard																				
Oystercatcher													1				1			
Razorbill																				

Species	**18/09/2007**																			
	Mid-Low tide								**Low-Mid tide**								**Low tide: 12:20**			
	10:00-12:00								**13:00-15:00**								**TOTAL**			
	B2				**C2**				**B2**				**C2**				**Both cells**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Red-breasted merganser																				
Redshank																				
Red-throated diver																				
Ringed plover																				
Sandwich tern					8	8							11	11			19	19		
Scaup																				
Shag																				
Teal																				
Velvet scoter																				

Total flights at each height through survey cells B2 and C2

Species	**TOTAL**			
	Both cells			
	1	**2**	**3**	**4**
Black-headed gull			1	
Black-throated diver	1			
Common guillemot	5			
Common gull		2		
Common scoter	2			
Common tern	7	46	4	1
Cormorant	362	34	4	
Curlew	7	2		
Dunlin	9			
Eider	178	11		
Gannet	194	45	20	
Goldeneye	2			
Grey plover	1			
Kittiwake	22	63	6	
Long-tailed duck	15			
Mallard		2	1	
Oystercatcher	336	63	2	4
Razorbill	1			
red-breasted merganser	18	2		
Redshank	3			

Red-throated diver	3			
Ringed plover	2			
Sandwich tern	84	147	11	
Scaup	1			
Shag	237	30	2	
Taiga bean goose	2			
Teal	2			
Velvet scoter	3	1	1	
Manx Shearwater	1			
Fulmar	3	4	3	
Peregrine		3	2	

ANNEX A8.1D: ACTIVITY SUMMARY RESULTS – MAXIMUM NUMBER OF INDIVIDUALS ON EACH SURVEY DATE

Year	2006									2007																				
Species/ Date	**28th Sep**	**11th Oct**	**18th Oct**	**25th Oct**	**1st Nov**	**15th Nov**	**30th Nov**	**5th Dec**	**21st Dec**	**6th Jan**	**27th Jan**	**6th Feb**	**19th Feb**	**11th Mar**	**22nd Mar**	**28th Mar**	**3rd Apr**	**18th Apr**	**24th Apr**	**8th May**	**15th May**	**30th May**	**11th Jun**	**28th Jun**	**9th Jul**	**23rd Jul**	**7th Aug**	**23rd Aug**	**30th Aug**	**11th Sep**	**18th Sep**
Eider	13	6	22	19	32	20	4	18	10	14	14	19	8	6	16	9	5	13	7	15	67	9	12	3	15	2	6	14	8	0	15
Long-tailed duck	0	0	0	0	0	13	0	2	6	13	0	4	0	0	5	3	1	10	5	0	0	0	0	0	0	0	0	0	0	0	0
Common scoter	0	0	0	0	0	0	0	0	2	0	0	0	0	0	12	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0
Velvet scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Goldeneye	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-breasted merganser	0	0	0	0	1	0	0	3	1	2	0	4	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-throated diver	3	0	1	0	2	0	0	1	0	1	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Cormorant	2	2	1	2	5	0	4	4	4	10	2	3	4	0	1	0	1	0	1	3	6	0	1	0	0	0	1	0	0	0	5
Shag	1	3	6	1	1	2	0	2	0	1	2	1	1	0	0	0	0	0	0	0	2	0	0	0	0	0	1	7	2	0	2
Grey heron	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Peregrine	0	0	0	0	1	1	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Oystercatcher	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ringed plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Common sandpiper (Common Scoter)	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Redshank	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turnstone	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kittiwake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	1	0	0	0	0	0

Year	2006									2007																				
Species / Date	**28th Sep**	**11th Oct**	**18th Oct**	**25th Oct**	**1st Nov**	**15th Nov**	**30th Nov**	**5th Dec**	**21st Dec**	**6th Jan**	**27th Jan**	**6th Feb**	**19th Feb**	**11th Mar**	**22nd Mar**	**28th Mar**	**3rd Apr**	**18th Apr**	**24th Apr**	**8th May**	**15th May**	**30th May**	**11th Jun**	**28th Jun**	**9th Jul**	**23rd Jul**	**7th Aug**	**23rd Aug**	**30th Aug**	**11th Sep**	**18th Sep**
Black-headed gull	0	10	2	7	0	1	4	0	0	1	0	0	8	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3	4	1
Lesser black-backed gull	1	0	0	0	8	0	0	2	0	0	0	0	0	0	0	0	0	0	3	2	4	0	0	0	55	0	96	1	0	91	53
Great black-backed gull	0	2	2	0	0	2	0	0	2	2	0	2	0	0	2	1	0	0	0	0	0	3	0	0	0	0	7	0	1	1	3
Herring gull	2	2	61	6	93	5	68	6	7	7	15	7	4	3	8	8	2	5	30	11	99	103	0	0	59	3	211	4	3	123	410
Common gull	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0
Sandwich tern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Common tern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Guillemot	3	2	3	2	0	0	0	0	0	1	0	6	0	0	0	0	0	7	5	2	27	6	1	8	8	0	2	0	0	0	2
Razorbill	8	0	0	1	0	0	0	0	0	0	0	0	0	0	3	5	0	2	0	0	0	1	0	2	0	0	0	0	0	0	2
Puffin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Woodpigeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Swallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	6	0	0	0	0	0	0	0	0	0	0
Chiffchaff (Carrion crow)	0	0	2	1	1	0	2	2	1	2	0	2	2	0	0	2	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0
Robin	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheatear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow wagtail (Grey wagtail)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pied wagtail	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	2	0	0	0	0	0	2

Year	2006									2007																				
Species/ Date	**28th Sep**	**11th Oct**	**18th Oct**	**25th Oct**	**1st Nov**	**15th Nov**	**30th Nov**	**5th Dec**	**21st Dec**	**6th Jan**	**27th Jan**	**6th Feb**	**19th Feb**	**11th Mar**	**22nd Mar**	**28th Mar**	**3rd Apr**	**18th Apr**	**24th Apr**	**8th May**	**15th May**	**30th May**	**11th Jun**	**28th Jun**	**9th Jul**	**23rd Jul**	**7th Aug**	**23rd Aug**	**30th Aug**	**11th Sep**	**18th Sep**
Rock pipit	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Linnet	0	0	1	0	30	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14

ANNEX A8.1E COLLISION RISK MODEL WORKED EXAMPLE - OYSTERCATCHER

Populate heavy bordered boxes

OYSTERCATCHER

Risk window (2B + 2C squares, approximately 100m from turbine)
W = width x height (m²)
63549.44

Width = 371.2m (100m buffer either side of turbine with 85.6m blades)
Height = 171.2m (Blade Diameter)

Number of Birds flying through risk window per annum (n)
2477.1

Based on 69 flights throughout the year, thus using the Tidal Regulated 'All Year' Scaling Factor of 35.9

Area of rotors (A)
A = N x πR²
23019.58035

Number of turbines (N)= 1
Rotor radius (R) = 85.6m

Total rotor area as a proportion A / W of the rick window
0.362231049

Number of birds passing through rotor
n x (A / W)
897.2825327 The Number of Bird transits Per annum through the rotors of the WF

Collision rate

Number of transits * probability of bird strike from stage 2	57.87707379	
Avoidance factor	**98%**	
Collison rate with avoidance	**1.157541476**	0.86389993

Although Birds in B2 and C2 squares are in an area larger than the 'risk window' this makes the collision model more precautionary

Appendix 9.1 – Indicative Surface and Coastal Water Management Plan

SCOTTISH ENTERPRISE

INDICATIVE SURFACE AND COASTAL WATER MANAGEMENT PLAN FOR FIFE ENERGY PARK OFFSHORE DEMONSTRATION WIND TURBINE (FEPODWT)

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JULY 2012

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INDICATIVE WATER MANAGEMENT PLAN

FIFE ENERGY PARK OFFSHORE DEMONSTRATION WIND TURBINE

1 INTRODUCTION

This Surface and Coastal Water Management Plan (SCWMP) forms an Appendix to the Environmental Impact Assessment (EIA) for Fife Energy Park Offshore Demonstration Wind Turbine (FEPODWT), (hereafter referred to as 'the Development'). The SCWMP presented in this document is intended to demonstrate measures that could be used across the Development site to adequately protect coastal hydrological conditions, and related resources. Detailed proposals for such measures will be documented prior to construction, and will provide the same or greater protection for the water environment as those described in this document. The measures are proportionate to the risk and, where greater risk is highlighted at specific locations prior to construction, specific measures would be agreed for those locations.

The methods set out in the SCWMP are based on good practice and the following guidance:

- The Construction Industry Research and Information Association (CIRIA), 'Environmental Good Practice On Site (C692)' (2010); and
- CIRIA, 'Control of Water Pollution from Construction Sites (C532)' (2001).

The SCWMP takes into account specific activities during the construction and operational phases of the Development, including:

- Turbine foundation installation; and
- Hardstanding areas and buildings (including construction compounds and associated infrastructure).

Recommendations are provided on the detailed coastal water quality monitoring programme that should be undertaken to ensure that construction activities associated with the activities mentioned above do not unduly affect the coastal water quality.

Drainage from the site will include elements of Sustainable Urban Drainage Systems (SUDS) design. SUDS replicate natural drainage patterns and have a number of benefits:

- SUDS will attenuate run-off, thus reducing peak flow and any flooding issues that might be onsite; and
- SUDS will treat run-off, which can reduce sediment and pollutant volumes in runoff before discharging into the coastal environment.

2 THE MANAGEMENT OF SURFACE WATERS

2.1 Location of Silt Traps

Silt traps will be utilised to trap and filter sediment-laden run-off from on shore excavation works at the Development. They will be installed in drainage ditches between the excavation areas and the shoreline.

3 THE MANAGEMENT AND MOVEMENT OF FRESH CONCRETE AND CHEMICALS

To ensure that the potential for accidental spillages is minimised, the following management measures are proposed.

3.1 Accidental Spillage

Concrete and chemicals handling will be conducted within a bunded area of Fife Energy Park and this area will be underlain by an impermeable ground membrane layer. The bund will have a 110 % capacity to attenuate stored liquids (including fresh concrete / cement). This will reduce the potential for accidental spillages to contaminate coastal water or groundwater.

Inflatable temporary bunding will be deployed should concrete/chemicals spillage occur elsewhere, associated with the construction of the onshore infrastructure.

Speed limits for vehicles transporting concrete onsite will be limited to 5 miles per hour, in accordance with PPG14: Marinas and Craft. Maximum vehicle load capacities will not be exceeded.

Any equipment observed to be leaking while onsite will be immediately relocated to a designated area for repair.

Measures to manage fresh concrete during pouring operations are described in Section 5.3 below.

3.1.1 Emergency Spillage Procedure

The appointed construction contractor will agree an emergency spillage procedure with SEPA prior to the construction phase of the Development. Measures may include:

- Informing SEPA of any spillages as soon as possible;
- Absorbable spill pillows, pads and socks can be placed in or over the spillage to absorb and/or contain the spill;
- A number of different types of general spillage absorbent granules and chemical binders can be placed on the spillage; and
- An absorbent boom will be stored onsite for any fuel or oil releases in coastal waters.

3.2 Vehicle Washing

Vehicle washing will take place offsite, therefore reducing the possibility of sediment-laden washout entering the Firth of Forth.

4 DISPOSAL OF WASTE MATERIALS

Waste, such as packaging, from transportation of construction materials and from general site operations would be stored in a designated area of Fife Energy Park and removed from site by a suitably licensed contractor.

Any sediment generated during the on-shore excavation will be tested in accordance with The Environmental Protection Act 1990 (Amendment) (Scotland) Regulations 2001[1] and reused onsite, wherever possible.

Details regarding materials generated in preparation of the turbine base are provided below.

5 CONSTRUCTION OF TURBINE BASE

5.1 Turbine Foundation Excavation

Before the turbine foundation is excavated, in preparation of the piles, an insulating metal jacket will be sunk into the seabed (48.3 m from the shoreline) to enclose the working area. This enclosure will be dewatered and any sediment removed before the piled foundations are installed. Stockpiles will be compacted to reduce the potential for sediment transfer into the Firth of Forth. Due to the industrial history of Methil Docks, any sediment removed during the excavation of the turbine foundation will be tested in accordance with The Environmental Protection Act 1990 (Amendment) (Scotland) Regulations 2001 before being used within the ongoing groundworks at Fife Energy Park. Should the excavated sediment test positive for elevated levels of contaminants it will be removed from the stockpiled area by a licensed contractor.

[1] (1990) "The Environmental Protection Act, Part II" [online] Available at: http://www.opsi.gov.uk/legislation/scotland/ssi2001/20010099.htm. [Accessed 24/02/2012].

5.2 Offshore Drilled Piles

The ground conditions in the area of the turbine are anticipated to be a solid geology of weathered sandstone with a superficial layer of sandy and colliery spoil deposits. As a result of the hard bedrock, the piled foundations which are found at each leg of the support structure are likely to be drilled and grouted steel piles. The piles would be installed in advance of the main structure installation and be grouted in place to provide adequate bearing and support for the turbine structure. The piles will be installed from a 'jack-up' barge or platform. They would be comprised of tubular steel of approximately 20 m long x 2 m in diameter. The piles are to be placed within the drilled holes, which are held open either by seawater or drilling mud. For drilled piles it is normal practice for a temporary (sometimes permanent) steel casing to be vibrated, twisted or surged into the seabed before drilling thus creating a seal with the solid geology below the superficial deposits. The casing or drill sleeve, is designed to contain fine material and to prevent the excavated hole from collapsing at the surface. Therefore, this ensures that there should be little release of fines or contamination of seawater by the drilling fluids associated with piling activity.

The most likely drilling method would be to utilise reverse circulatory drilling. Reverse circulatory drilling is usually employed with large diameter piles where normal direct circulation will not develop sufficient return velocity to flow or transport the cuttings to the surface. Using this method, seawater or drilling mud is pumped into the steel casing to maintain the desired head of pressure. The fluid them moves slowly down the casing and through the drill teeth, being accelerated to a high velocity up through the drill stem. This technique can remove high density drill cuttings, but the low velocity along the walls helps to prevent erosion and minimises collapse of the excavation.

Pile cuttings will be collected on the platform and transferred to shore. After the hole has been drilled, the pile is placed and grouted.

5.3 Concrete Pouring for Onshore Building Foundations

Methods to protect coastal waters from the transportation of concrete are considered in Section 3.

To prevent pollution it is important that all concrete pours are planned and that specific procedures are adopted where there may be a risk of coastal water or groundwater contamination, in accordance with CIRIA C532. These procedures will include:

- Onshore buildings and site compound foundations are constructed in holes in the ground that are typically de-watered, and hence water flow is typically into the foundation area. This will prevent concrete leaching to surface water in the event of shutter collapse;
- Ensuring that all excavations are sufficiently dewatered before concrete pours begin and that dewatering continues while the concrete cures. However, construction good practice will be followed to ensure that fresh concrete is isolated from the dewatering system; and
- Ensuring that covers are available for freshly placed concrete to avoid the surface of the concrete washing away during heavy rain events.

Any additional areas excavated onshore will be back-filled with compacted layers of material from the original excavation, where this is suitable, and capped.

6 DECOMMISSIONING

Decommissioning will be undertaken in accordance with good practice, and agreed with the relevant consultees in advance of the works commencing.

7 MONITORING PROGRAMME

A coastal water monitoring programme will be established in agreement with SEPA prior to the construction phase of the Development. An indicative monitoring programme is set out below.

Monitoring would be undertaken at locations on the Firth of Forth northeast of the Development infrastructure and southwest of other non-natural influences, where possible. It is anticipated that there would be up to 2 monitoring points, with details to be agreed with SEPA prior to implementation.

The following sampling frequency is proposed in order to represent baseline hydrochemical conditions and set threshold values for surface water and groundwater constituents:

- Once per month for two months prior to the construction phase.

Values for coastal water chemical constituents will be agreed with SEPA prior to the construction phase of the Development.

The following sampling frequencies are proposed in order to monitor coastal water conditions against baseline conditions:

- Once per month during minor excavation works, *e.g.*, onshore buildings erection;
- Twice per month during major excavation works, *e.g.*, turbine foundations; and
- Once after the construction phase.

7.1 Water Analysis Suite

Subject to agreement with SEPA, the following coastal water constituents will be tested for in a UKAS accredited laboratory:

- pH;
- Biological Oxygen Demand;
- Volatile Organic Compounds;
- Dissolved Oxygen Content;
- Heavy Metals;
- Iron;
- Magnesium;
- Aluminium;
- Chloride;
- Sodium; and
- Calcium

Following adoption of a coastal water monitoring programme, in agreement with SEPA, any activity detrimental to water quality will be detected at the earliest opportunity during the construction phase of the Development. This will allow action to be taken to prevent any further effect on water quality.

8 CONCLUSIONS AND RECOMMENDATIONS

The purpose of this SCWMP is to detail appropriate water management measures to control surface water run-off, and drain hardstandings and structures during the construction and operation of the Development. The measures detailed throughout this report would ensure that any effects on the coastal and groundwater environment are minimised.

This document would be adapted to meet the additional requirements of the construction contractor, when appointed, to ensure that all measures implemented are effective and site-specific. Consultation with bodies including SNH and SEPA would be carried out to confirm agreement with the measures proposed prior to construction commencement.

The SCWMP is considered to be a live document, such that modifications can be made following additional information and advice from consultees.

Appendix 10.1 – Archaeological Desk Based Assessment

MOWT10

FIFE ENERGY PARK OFFSHORE DEMONSTRATION WIND TURBINE
Appendix 10.1

Archaeological Desk-based Assessment

for Arcus Renewable Energy Consulting Ltd
on behalf of Scottish Enterprise

March 2012

HEADLAND
ARCHAEOLOGY (UK) Ltd

FIFE ENERGY PARK OFFSHORE DEMONSTRATION WIND TURBINE

Archaeological Desk-based Assessment

for Arcus Renewable Energy Consulting Ltd on behalf of Scottish Enterprise

March 2012

HA Job no.: MOWT10

NGR: NT 368 983 (centre)

Parish: Wemyss

Council: Fife

NMRS no.: NT39NE 14

Project Manager	Richard Conolly
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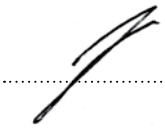

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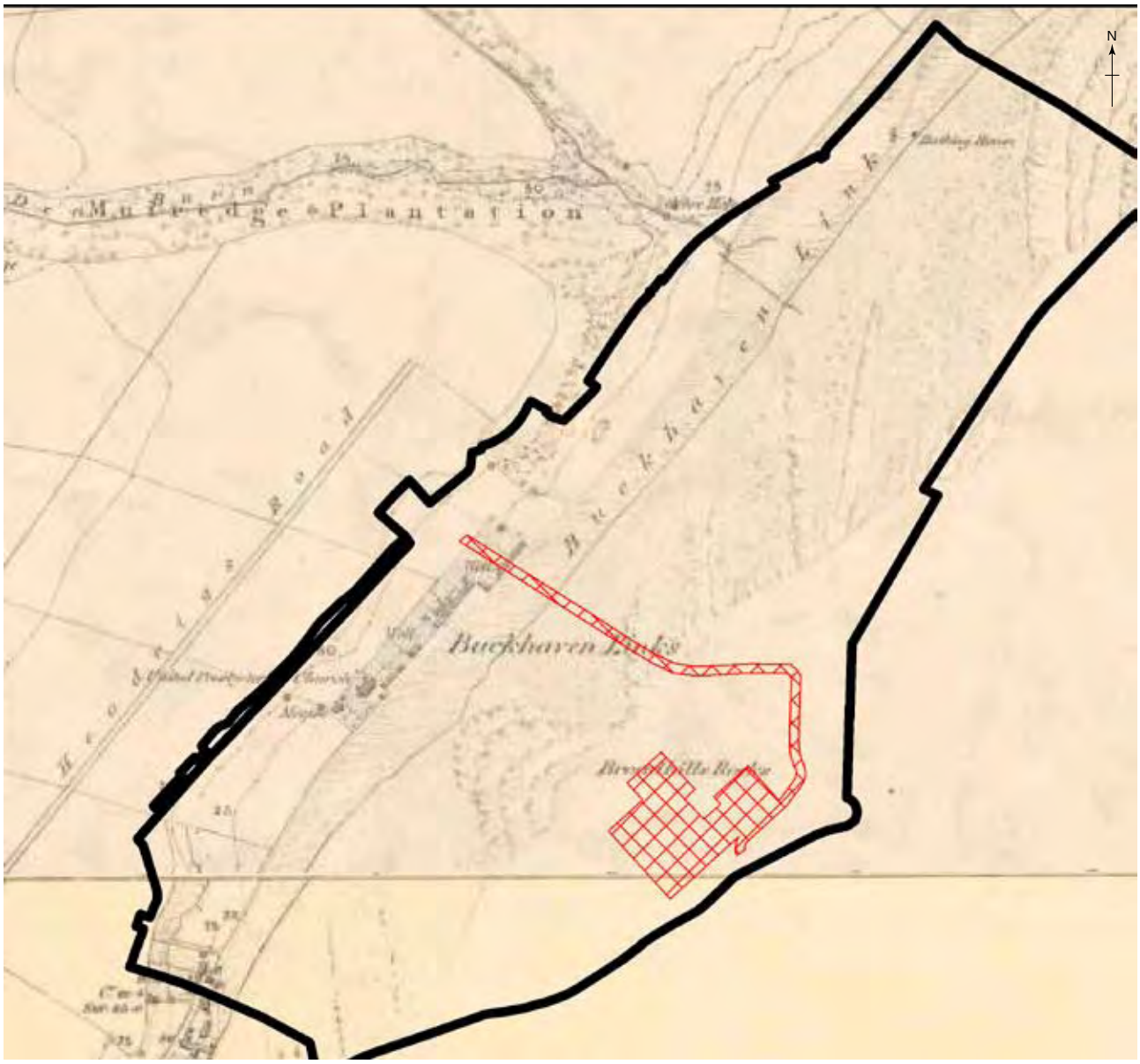


Illus 1

The 1st edition Ordnance Survey 6" map of 1855 shows the extent of land reclamation within the application boundary since 1855

FIFE ENERGY PARK OFFSHORE DEMONSTRATION WIND TURBINE

Archaeological Desk-based Assessment

This report presents the results of an archaeological desk-based assessment of the site of a proposed wind turbine demonstration project.

The construction footprint of the proposed development takes in land that was largely reclaimed in the latter part of the 19th century, before which it was a rocky foreshore. There is negligible potential for cultural heritage assets to have been present and gone unrecorded in this environment. The exception to this is the northern part of the application area, which crosses the site of the former settlement of Buckhaven Links. The settlement was cleared in 1905 and it is unlikely that substantial remains have survived the subsequent development of the site. It is concluded that there is negligible potential for the proposed development to impact on archaeology.

1. INTRODUCTION

This report presents the results of an archaeological desk-based assessment of land at Methil, Fife. It has been prepared for Arcus Renewable Energy Consulting Ltd, acting on behalf of Scottish Enterprise who are proposing to build a wind turbine demonstration site within the Fife Energy Park. The development will initially consist of one turbine and an operations building. The turbine will be located adjacent to the shore near the operations building.

1.1 SITE DESCRIPTION

The proposed development site is 2ha in area and is situated on the coast of the Firth of Forth, on the western shore of Largo Bay. This area of the Scottish coast is characterised by sandy bays interrupted by rocky headlands (Robertson 1996, 1). The onshore area of the development site is flat and low-lying and lies between the towns of Methil and Buckhaven, in an area of partially reclaimed semi-derelict industrial land. The underlying geology of the site belongs to the Scottish coal measures with overlying sand and gravel deposits.

2. AIMS

The desk-based assessment has been undertaken in order to inform the assessment of cultural heritage and archaeological effects associated with the development through identifying any cultural heritage assets present within the development site and by providing an indication of the archaeological potential.

3. METHODS

The following data sources have been used in the preparation of this report:

- Databases of designated cultural heritage features maintained by Historic Scotland;
- Records held by the National Monuments Record of Scotland (NMRS) including aerial photographs;
- Records held by the local Historic Environment Record;
- Maps held by National Library of Scotland;
- Other readily available published sources.

Data has been collected from the above sources for an area extending 500m from the Energy Park boundary (Appendix 1).

The development site was previously visited on the 9th February 2010 as part of the 2-B Energy application (McCarthy, 2010). This site visit verified the findings of the desk-based element of the study and gathered information regarding the current land use as well as

identifying factors that might affect the archaeological potential of the development site. The results of this site visit have been incorporated in this assessment.

4. RESULTS

4.1 Limitations of data

The extension of the shoreline in this area during the extension of the Wellesley colliery in 1905 has obliterated the original topography of the site and rendered identification of previously unrecorded sites highly unlikely. The identification of cultural heritage assets must therefore rely entirely on cartographic or other documentary evidence at this stage. There have been no previous archaeological excavations in Buckhaven, Methil or Leven. However, it is considered that these limitations have not affected the reliability of the assessment.

4.2 Historic background and identified cultural heritage assets (Illus 2)

Prehistoric and Roman

There are two sites of prehistoric/Roman date within the study area.

A Bronze Age cist cemetery (HA15) was discovered about 400m east of the Forth Energy Park boundary in 1906 (presumably during the clearance of the village at Buckhaven Links). The cemetery was located on the summit of a small prominence known as 'the Sussan Brae' and has been completely removed. However the location of this site is uncertain as it is recorded a second time at a different location under the NMRS entry for the White Swan Hotel (HA19) a C(S) listed building dating to the early 20th century. In this entry it is suggested that the construction of the hotel led to the discovery of the cemetery. This would place the cemetery 600m to the east and almost immediately adjacent to the boundary of the Fife Energy Park. The original sources referring to the discovery of the cemetery from The Reliquary and the Proceedings of the Society of Antiquaries (1948–9, 242–3 and 1949–50, 226) only give the location of these finds as the 'Sussan Brae'. As none of the maps consulted appear to use this name it is difficult to be certain exactly where the cemetery was.

A Roman coin (HA 16 Licinius I – 308–324AD) minted in Alexandria was discovered in a garden around 500m west of the Forth Energy Park boundary some time before 1960. Outwith the study area a similar Roman coin (NT39NE 9) was found in 1951 in the playground of Buckhaven Primary School. The coin was of Maximian, of AD 305, also minted at Alexandria. The school is about 160m to the west of the Energy Park boundary. It is quite possible that this coin is a modern loss, especially as it was recovered from a school

Medieval and post-medieval

No medieval or post-medieval assets have been recorded within the Forth Energy Park boundary. However, there is extensive evidence of activity of these periods in the study area.

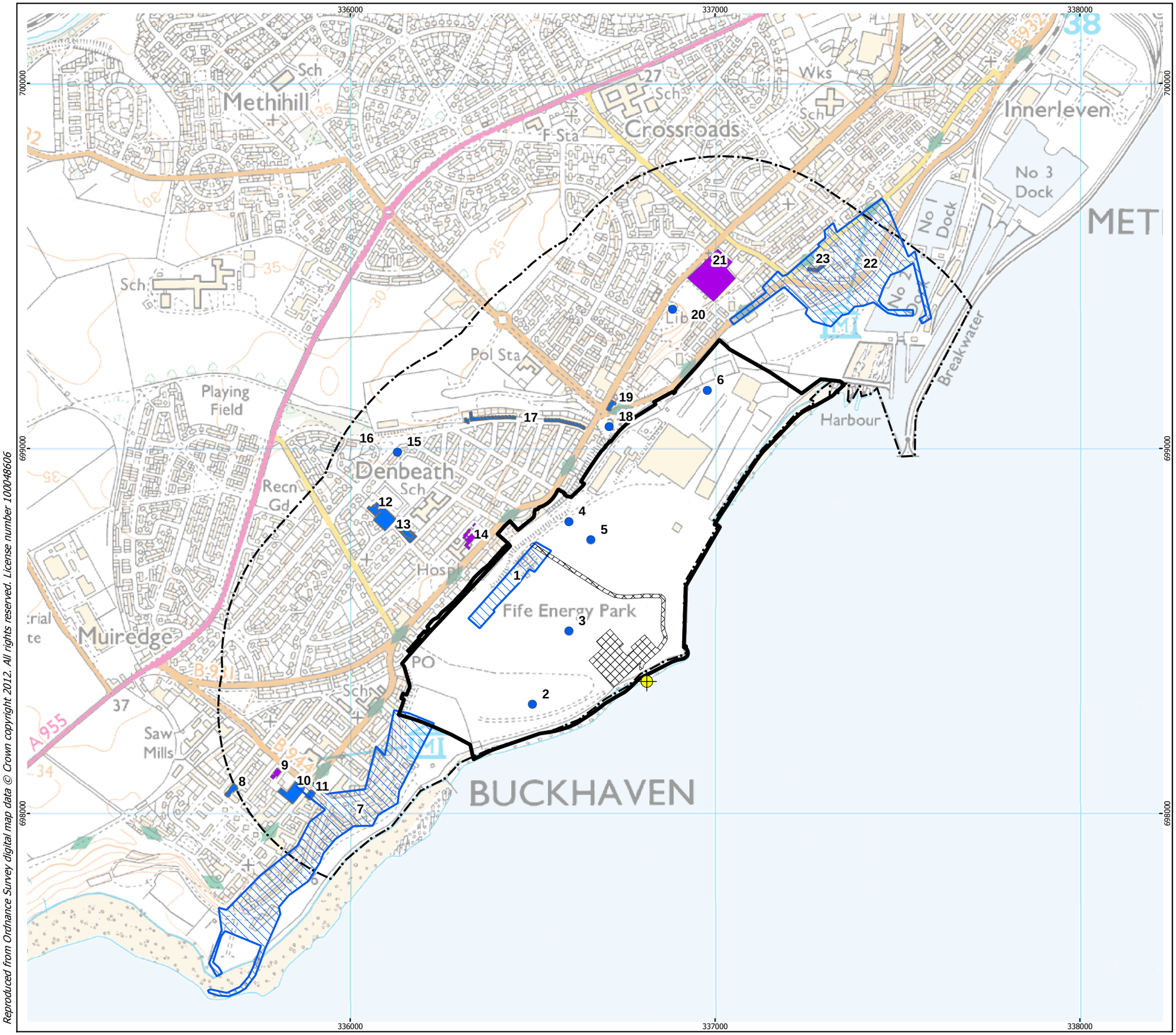
The town of Methil (HA22) is known to have existed as early as 1212, although it was originally further inland and relocated to the coast sometime around the early eighteenth century. Buckhaven (HA7) was later in date and was first mapped around 1600. From an early date the production of salt, coal and fish were important to the two towns. These industries grew and were supplemented in the eighteenth and nineteenth centuries with net and rope manufacture and baking. There are few records of medieval sites in the immediate vicinity of the proposed development. Some cropmark remains of rig and furrow cultivation (NT39NE 141) have been recorded outwith the study area 670m west of the Energy Park. These are likely to represent medieval or post-medieval agricultural use of the land in the area.

19th century (Illus 1)

One cultural heritage assets dating to the 19th century is recorded within and to the south of the development site. This is a short-lived settlement (HA1), no surface trace of which survives.

The Forth Energy Park lies within a stretch of beach between the two settlements which was labelled as Buckhaven Links on the 1st edition Ordnance Survey (1855). Buckhaven Links (HA1) first appears on Greenwood's map of 1828 but the only clear picture of the town is from the 1st edition of the Ordnance Survey of 1855, where a string of approximately nine detached and semi-detached houses appears in a row to the immediate west of the coast road. At the southern end of this row a United Presbyterian church occupies a large plot of land with an adjacent building described as a manse to the south of this. Although there are few cartographic or documentary references to the settlement, its layout suggests a foundation not later than the eighteenth or nineteenth century and it is likely that it was laid out in a single event, possibly to serve as a fishing or mining settlement. A reference to a church and manse built by the United Presbyterian Church in Buckhaven in 1861 and 1868 respectively is likely to refer to these buildings (Small 1904, 276).

The extent of development of Buckhaven (HA7), Buckhaven Links (HA1) and Methil (HA22) at the time of the 1st edition of the Ordnance Survey in 1855 is shown on Figures 1 and 2. Also shown on the 1st edition Ordnance Survey further north along the beach



Scottish Enterprise

arcus

- Turbine
- Development site
- Fife Energy Park boundary
- Study area
- Category B listed building
- Category C(S) listed building
- Undesignated cultural heritage asset (polygon)
- Undesignated cultural heritage asset (point)

Sites and Monuments Record information derived from Fife Council data dated 23/02/2012

Listed Building data provided by Historic Scotland dated 28/02/2012 © Crown Copyright Historic Scotland

Seazone data (derived from UK Hydrographic Office) provided by Arcus Renewable Energy Consulting 28/01/2010

1:10,000 Scale @ A3

0 170 340 m

N

Produced: LB
Reviewed: RC
Approved: RC

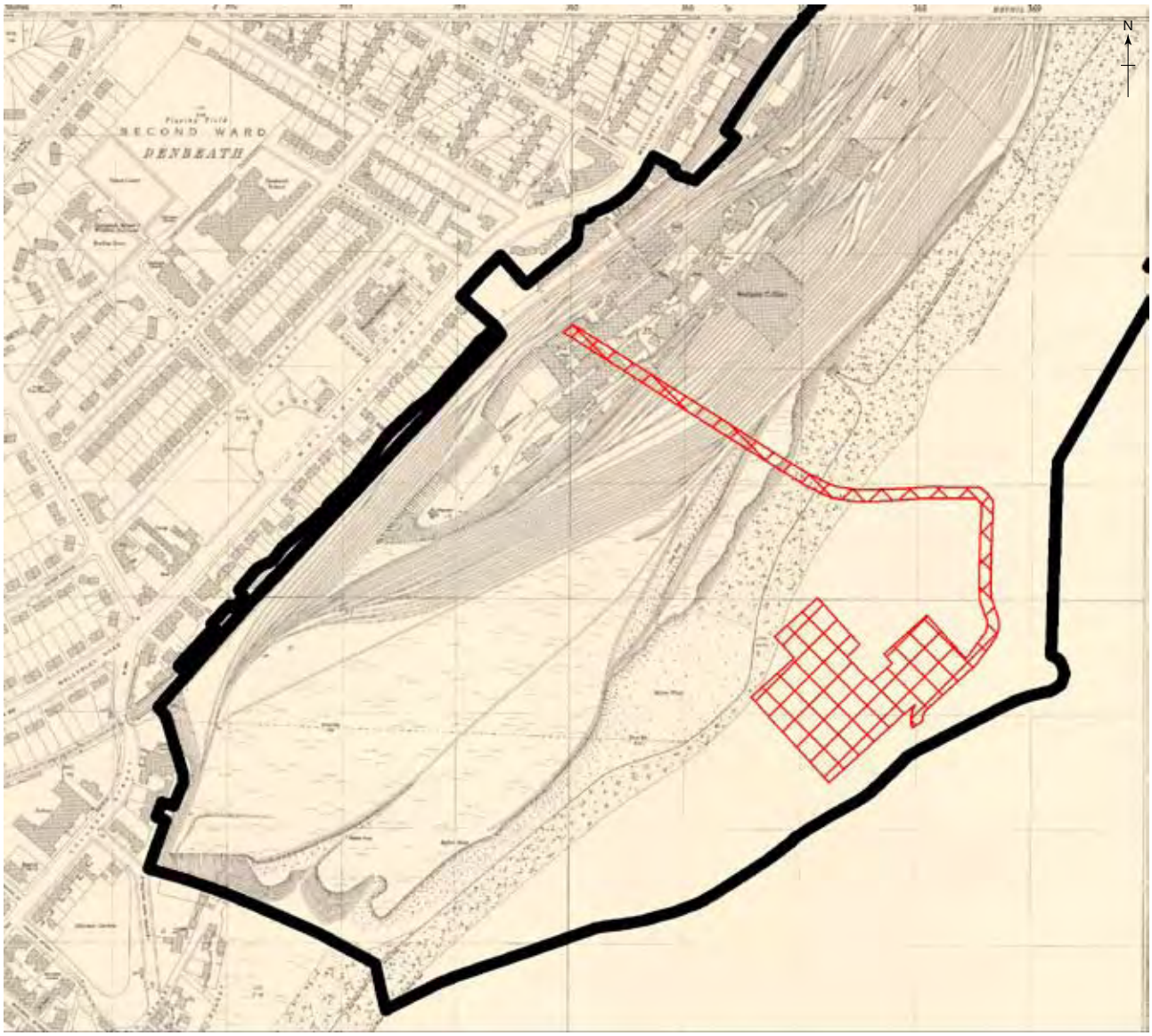
Ref: 867/ENV/100 | Revision: A

Date: 20.03.12

Cultural heritage assets within the onshore study area
Illustration 2

Fife Energy Park Offshore Demonstration Wind Turbine (FEPODWT)

P:\1projects\MOWT10\MOWT10-Project-Archive\MOWT10-002\MOTW10-002-GIS



Illus 3

The 1948 Ordnance Survey map (1:25.000) shows railway sidings across the area now occupied by the Fife Energy Park

is a small bathing house (HA6) to the immediate south of the coastal path. By the time of the second edition of the Ordnance Survey in 1895 Buckhaven Links had nearly twice as many buildings as it had in 1855 although new construction was largely confined within the existing footprint of the town due to the subdivision and redevelopment of garden plots. By this stage the manse building is labelled as '*Old Manse*', suggesting that it was no longer used for its original purpose of providing accommodation to a minister.

In the latter half of the 19th century the coal mining industry in the wider area expanded enormously, with the establishment of the Pirnie pit (*c*1860), the Muiredge pit (first productive in 1864), the Rosie pit (1872-75), and the Leven pits (1877–8). This period also saw the establishment of railways which served the collieries and much of the population of Buckhaven and Methil left the fisheries to work in the mines. Denbeath Colliery (HA5) was built in 1872 to the immediate northeast of Buckhaven Links and within the Forth Energy Park boundary. Around the same time railway sidings were put in place to the colliery and an adjacent creosote works.

20th century

There are three cultural heritage assets dating to the 20th century within the Forth Energy Park boundary. These comprise a bing (HA2), a 1970s oil rig construction yard (HA3) and a brickworks (HA4). No surface traces of either the bing or the brickworks survive.

In 1905 the Wemyss Coal Company bought the Denbeath colliery and cleared away the entire settlement at Buckhaven Links and the creosote works. They also closed the coastal road between Buckhaven and Methil at the same time, to make way for a third shaft and a Baum washery (for cleaning coal). The former site of Buckhaven Links and Denbeath Colliery was renamed as the Wellesley Colliery and a number of railway sidings were built to transport the coal to the washery and on to the harbour at Methil were added (Illus 3). Methil rapidly developed into Scotland's largest coal port by 1913, exporting three million tons of coal in 1923 (Smith 2001, 131 and 653). The Ordnance Survey map of 1914 shows Buckhaven Links and the creosote works entirely cleared with a massive expansion of the colliery and a new planned town of Denbeath to the immediate NW of the application boundary.

From some time shortly before this, coal spoil was being dumped to the east of the development site. This began to extend the shoreline in this area though initially the change was slight. At the same time a large bing (HA2) began to be created which would later be used to actively accelerate this process of expansion.

The coast of Fife in this area preserves a large number of cultural heritage assets relating to WWI and WWII (Robertson 1996, 2). Within the immediate vicinity of the Forth Energy Park there are several such sites. The Buckhaven and Methil WWI monument (HA20) unveiled in 1922 stands about 70m west of the Energy Park boundary. A WW2 concrete built Extended Defence Officers Post or XDO post (HA18) is situated about 30m to the west of the Energy Park boundary, by a road junction on the coast side of the road. The XDO post has been buried with only the top visible above ground and trees have been planted round it with the intention of concealing the structure. The XDO post was the control position for a submarine mine field which was laid in the approaches to Methil Docks.

Wellesley Colliery closed in 1964, as did most of the other collieries in the area during the 1960s. For a period around the 1960s the eastern edge of the Forth Energy Park was used as a refuse tip expanding the shoreline further. At some point between 1967 and 1984 most of the colliery infrastructure was removed. The site of the colliery was then developed as an industrial yard (HA3) for the construction of oil rig structural elements beginning in 1972 (Smith 2001, 653) and has passed through various owners until its closure in 2001. After its acquisition by Scottish Enterprise some 300m of repairs to coastal defences at the site have been completed. A comprehensive programme of earthworks and site platforming have also been undertaken with the addition of a series of embankments between the Park and neighbouring residential properties and an extension of the reclaimed area of approximately 28 hectares. Burntisland Fabrications currently operates in buildings in the north-eastern part of the site producing major fabrications for use in offshore gas and oil installations.

4.3 Potential for unrecorded archaeological features

Although there are a number of prehistoric, Roman and medieval sites in the vicinity of the proposed development the potential for pre-modern sites to be present is considered to be negligible. The greater part of the development site is depicted as a predominantly rocky beach on the First Edition Ordnance Survey map. In this context there is no potential for traces of pre-19th century activity to survive. The northwest part of the Forth Energy Park marked Buckhaven Links on the First Edition map, may, from its name, be assumed to be part of a dune system. Based on the heights marked on the First Edition and sea-change curves (Shennan & Horton 2002) the dunes covered an area that is likely to have been submerged or in the intertidal zone during the prehistoric period. Land in the intertidal zone is likely to see a limited range of human activity and consequently the potential for prehistoric sites is limited; fish-traps being the most common site type. The dunes could potentially have masked substantial remains of later date. However, there is no indication, such as place name evidence, that this may be the case and the potential for any such site to survive is negated by development of the site in the early 20th century. It may be assumed that the links area saw considerable ground preparation before the construction of the railway sidings serving Wellesley Colliery. Geotechnical reports for the Forth Energy Park have shown thick deposits of made ground within parts of the area. These are up to 24m thick eastern side of the Forth Energy Park and around 10–15m thick towards the west of the Forth Energy Park boundary. (Scottish Enterprise Fife 2005 and 2007). Sites created since the process of land reclamation began, such as sites relating to WWII in particular, are more likely to have survived as they may have been built on top of this overburden but extensive landscaping within the Fife Energy Park as well as reinforcement of coastal defences is likely to have destroyed any such sites. Those parts of the Forth Energy Park boundary not affected by the sidings have for the most part been disturbed by later buildings, some of which still stand. Again it is highly unlikely that substantial remains survive undisturbed.

It is considered to be highly unlikely that there will be any surviving cultural heritage assets within the proposed development site.

5. CONCLUSIONS

Although a number of features of cultural heritage interest have been identified within the Forth Energy Park and one feature within the development site, it is highly likely that subsequent industrial operations have removed them entirely.

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6.2 Unpublished sources

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6.3 Cartographic sources

The following cartographic sources (listed in chronological order) held by the National Library of Scotland were consulted:

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6.4 Aerial photographs

The vertical aerial photographs held by the NMRS and examined in the course of the assessment are summarised below.

Sortie	Frames	Date
106G/DY/009	60067	1944
58/6511	0061	1964
ASS/518/88	094	1988

Table 1
Aerial photos

6.5 Monuments records

Data regarding designated assets was downloaded from Historic Scotland's website on 28/02/2012. © Historic Scotland.

NMRS data has been gathered by examination of the following quarter sheets held in the NMRS Library, Edinburgh, in conjunction with Pastmap. These were examined on 5/02/2010.

7. APPENDICES

Appendix 1 – Concordance of cultural heritage assets

HA no.	Name	Type	Description	Status	LB no.	NMRS no.
1	Buckhaven Links	Village (19th century)	Buckhaven Links first appears on Greenwood's map of 1828 but the only clear picture of the town is from the 1st edition of the Ordnance Survey of 1855, where a string of approximately nine detached and semi-detached houses appears in a row to the immediate west of the coast road. At the southern end of this row a United Presbyterian church occupies a larger plot of land and there is a building described as a manse to the south of this. Although there are few cartographic or documentary references to the settlement, its layout suggests a foundation not later than the eighteenth or nineteenth century and it is likely that it was laid out in a single event, possibly to serve as a fishing or mining settlement. A reference to a church and manse built by the United Presbyterian Church in Buckhaven in 1861 and 1868 respectively is likely to refer to these buildings (Small 1904, 276).	–	–	–
2	Coal Bing	Coal Bing	A coal bing derived from 20th century mining at Dunbeath/ Wellesley Colliery.	–	–	NT39NE 140
3	RGC Construction Yard	Construction Yard	A late 20th century construction yard.	–	–	NT39NE 14
4	Wemyss Brickworks	Brickworks	A brickworks dating to the late 19th/early 20th century	–	–	NT39NE 54
5	Denbeath/ Wellesley Colliery	Colliery	Denbeath Colliery was built in 1872 to the immediate NE of Buckhaven Links and within the site boundary. In 1905 the Wemyss Coal Company bought the colliery and expanded it over the cleared sites of Buckhaven Links and the creosote works. They also closed the coastal road between Buckhaven and Methil at the same time, to make way for a third shaft and a Baum washery (for cleaning coal). The site of Buckhaven Links and Denbeath Colliery was renamed as the Wellesley Colliery and a number of railway sidings were built to transport the coal to the washery and on to the harbour at Methil were added. Wellesley Colliery closed in 1964, as did most of the other collieries in the area during the 1960's.	–	–	NT39NE 59
6	Bathing House	Bathing House	A small bathing house or changing hut which appears on the 1st edition of the Ordnance Survey.	–	–	–
7	Buckhaven	Town	For the purposes of this study all development within the village of Buckhaven up to 1855 is considered as one site with the exception of listed buildings which are listed separately. Buckhaven was still a small fishing village by the time of the 1st edition Ordnance Survey in 1855. The town was laid out in a linear strip along the coast and ran up to the edge of what is now the Fife Energy Park.			NT39NE 44, 52, 137, 138
8	Buckhaven Community Centre	Community Centre	A two-storey former Miners'Welfare Institute built in 1925.	C (S) Listed Building	46070	NT39NE 80
9	St. Andrew's Theatre/ Church	Church/Theatre	Ecclesiastical building no longer in use as such. Formerly St Andrew's Church, home of the Buckhaven Free Church congregation which formed in 1866. In 1870 the Episcopal Church at North Street, St Andrews was purchased for the sum of £130, it was transported to Buckhaven in Thomas Walker's boat 'The Sea King', and re-erected in 1872. In 1972 the congregation united with nearby St David's Parish Church (listed separately) and St Michael's, and the building closed until 1987 when it was converted and extended to a theatre.	B-Listed Building	22711	NT39NE 40
10	Buckhaven Parish Church	Church	Ecclesiastical building in use as such. Formerly St David's Church. In 1972 the congregations of St Andrews and St Michael's Churches united with St David's to form the Buckhaven Parish Church. Church interior "upgraded" during the 1980s under a Community Programme scheme.	C (S) Listed Building	46068	NT39NE 77
11	Royal Bank buildings	Bank	A late 19th century two-storey building in use as a bank.	C (S) Listed Building	46069	NT39NE 79

HA no.	Name	Type	Description	Status	LB no.	NMRS no.
12	Denbeath Miner's Welfare Institute	Welfare Institute	A two-storey building dating to 1924. In spite of unsympathetic extensions, this building retains its integrity and historic interest, now as a bowling pavilion with green.	C (S) Listed Building	46072	NT39NE 96
13	Denbeath Parish Church	Church and Hall	The former Denbeath Parish Church is prominently situated on a corner site in an area of Denbeath developed by the Wemyss Coal Company.	C (S) Listed Building	50126	
14	Randolph Wemyss Memorial Hospital	Hospital	Commissioned by Lady Eva Wemyss as a memorial to her husband, the Randolph Wemyss Memorial Hospital was opened on 28 August, 1909. Single storey and attic, 7-bay hospital in Scots Renaissance style.	C (S) Listed Building	22716	
15	Denbeath	Cist, Urns, Beaker	A Bronze Age cist cemetery was found in 1906, on the eastern top of a height known locally as 'the Sussan Brae' now named Denbeath. The location of this site is uncertain. See the entry for the White Swan Hotel and the text above. Over a dozen cists were found, some containing urns. Four urns, including portions of a Beaker, are now in the National Museum of Antiquities of Scotland. The site of the cemetery, located at NT 3613 9900 from the descripton above, is now part of a new housing development area. No further finds have been reported.	–	–	NT39NE 1
16	Denbeath	Roman Coin	A fairly worn bronze coin of Licinius I, minted at Alexandria, which was found, perhaps before 1960, in a Methil garden, was presented to Kirkcaldy Museum by Inspector D T Donaldson, Fife Constabulary, Kirkcaldy. The location shown is very approximate and it is likely that the findspot was actually outwith the study area.	–	–	NT39NE 2
17	1-51 Cowley Street	Cottages	A row of cottages erected for workers of Bowman & Company owners of Denbeath Colliery. The cottages were leased to the Wemyss Coal Company in 1905, after which they provided accommodation for employees of the Wemyss Private Railway.	C (S) Listed Building	46071	NT39NE 97-120
18	Methil XDO Post	XDO Post	A WW2 concrete built Extended Defence Officers Post (XDO post) is situated on the S side of Methil, by a road junction on the coast (S) side of the road. The XDO post has been buried with only the top visible above ground and trees have been planted round it with the intention of concealing the structure. The XDO post was the control position for a submarine mine field which was laid in the approaches to Methil Docks.	–	–	NT39NE 15
19	The White Swan Hotel	Hotel/Bronze Age Cemetery	An early 20th century 2-storey 9-bay hotel. According to the listed building report a Bronze Age cemetery was discovered during the construction of the hotel in 1906. However this would appear to be the same site recorded separately as NT39NE 1. It is difficult to be certain exactly where the cemetery was (see text above).	C (S) Listed Building	22713	NT39NE 7
20	Buckhaven and Methil War Memorial	War Memorial	A World War I war memorial with a soldier on a plinth, with World War II role-of-honour added. The statue was unveiled in 1922.	C (S) Listed Building	46077	NT39NE 56
21	Methil parish Church	Church	Ecclesiastical building in use as such. This Cruciform-plan, aisless Romanesque Church was built for the Baird Trust in 1925. The previous Methil Parish Church was situated in Lower Methil, and the foundation stone of that building (dated 1837) is now located in the Narthex of the present church.	B-Listed Building	22712	NT39NE 50
22	Methil	Town	For the purposes of this study all development within the village of Methil up to 1855 is considered as one site with the exception of listed buildings which are listed separately. Methil was still a small fishing village by the time of the 1st edition Ordnance Survey in 1855. It had a small harbour, a church, tavern, school and ropewalk. However many of its buildings were in ruin at this time. The extent of its development at this stage is largely within the onshore outer study area but not within Fife Energy Park.	–	–	NT39 NE 11, 53, 66, 68, 69, 75, 131, 132, 133
23	313-338 High Street, Lower Methil	Terrace	An early 20th century terraced crescent of two-storey local authority houses (25) with crowstepped gables and Scottish 17th century details.	C (S) Listed Building	46074	NT 39NE 84–95

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Appendix 14.1 – Shadow Flicker

14 SHADOW FLICKER

14.1 Introduction

This Technical Appendix presents the following information in support of Chapter 14: *Shadow Flicker* of the Fife Energy Park Offshore Demonstration Wind Turbine Environmental Statement:

- Percentage of Bright Sunshine: Calculations for the percentage of bright sunshine (see Table A14.3 below) that occurs in Fife during each month of the year using
- (1) Sunshine data for the years 2000-2011, sourced from the UK Met office website (Table A14.1); and
- (2) Sunrise and sunset times sourced from the US Naval Almanac website (Table A14.2).
- Results for the Assessment Locations: Charts showing the months and times of the day during which effects would occur based on the theoretical hours per annum, along with discussion of the results for the worst-case scenario for each assessed location.

14.2 Percentage of Bright Sunshine

Table A14.1 Sunshine data in hours from the UK Met Office Historical Station, Leuchars – Fife for the year 2000 – 2011.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average	Bright Sunshine per month (Hrs)
Jan	96.7	69.8	50.1	66.5	57.8	73.8	40.5	73.3	48.8	67.6	59.5	53	63.11666667	63
Feb	95.3	99.7	80.5	102.7	119.7	96.8	61.2	75.6	92.6	65.9	81.7	49.3	85.08333333	85
Mar	126.6	120.5	123.6	160	130.2	112.5	75.4	136.2	142.1	162.5	108.5	124.5	126.8833333	127
Apr	142.8	159.8	151	199.6	107.9	170.1	204.8	191.3	161.9	127.2	161.4	200.3	164.8416667	165
May	228.2	245.5	176.1	183.4	210.4	220.6	217.4	187.9	188.6	222.7	204.7	202.7	207.35	207
Jun	181.8	201.5	166.2	226.5	185.6	174.3	192.8	67	170.9	157.7	187.9	155.3	172.2916667	172
Jul	165	149.7	145.9	173.5	164.9	217.6	203.3	147.9	109.8	180.9	160.3	168.7	165.625	166
Aug	169.5	147.6	148.9	201.8	134.5	184.4	158	165.3	94.9	168.1	153.4	113.1	153.2916667	153
Sep	124.2	121.2	125.4	151.6	154	113	129.5	150.3	93.7	135.6	142.1	130.1	130.8916667	131
Oct	120.8	94.7	90.9	140.2	95.1	52.1	76.8	123	126.5	89.8	100.3	76	98.85	99
Nov	97.3	79.5	65.8	93.5	82.1	89.3	92.9	69.8	99.5	78.1	76.6	67.4	82.65	83
Dec	51.3	64.4	20.2	57.1	76.2	50	66.8	42.1	49.6	38.9	73.8	55.3	53.80833333	54

Source: http://www.metoffice.gov.uk/climate/uk/stationdata/leucharsdata.txt

Table A14.2 Sunrise and sunset hours per month for 2009 (Location: N 56o 20' W 03o 01')

Day	Jan.			Feb			Mar		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
01	08:44	15:47	07:03	08:08	16:44	08:36	07:04	17:46	10:42
02	08:44	15:48	07:04	08:06	16:46	08:40	07:02	17:48	10:46
03	08:44	15:50	07:06	08:04	16:49	08:45	06:59	17:50	10:51
04	08:43	15:51	07:08	08:02	16:51	08:49	06:57	17:52	10:55
05	08:43	15:52	07:09	08:00	16:53	08:53	06:54	17:54	11:00
06	08:42	15:54	07:12	07:58	16:55	08:57	06:52	17:56	11:04
07	08:42	15:55	07:13	07:56	16:57	09:01	06:49	17:58	11:09
08	08:41	15:57	07:16	07:54	17:00	09:06	06:46	18:01	11:15
09	08:40	15:59	07:19	07:52	17:02	09:10	06:44	18:03	11:19
10	08:39	16:00	07:21	07:49	17:04	09:15	06:41	18:05	11:24
11	08:39	16:02	07:23	07:47	17:06	09:19	06:39	18:07	11:28
12	08:38	16:04	07:26	07:45	17:08	09:23	06:36	18:09	11:33
13	08:37	16:05	07:28	07:43	17:11	09:28	06:33	18:11	11:38
14	08:36	16:07	07:31	07:40	17:13	09:33	06:31	18:13	11:42
15	08:34	16:09	07:35	07:38	17:15	09:37	06:28	18:15	11:47
16	08:33	16:11	07:38	07:36	17:17	09:41	06:25	18:17	11:52
17	08:32	16:13	07:41	07:34	17:20	09:46	06:23	18:19	11:56
18	08:31	16:15	07:44	07:31	17:22	09:51	06:20	18:21	12:01
19	08:29	16:17	07:48	07:29	17:24	09:55	06:17	18:23	12:06
20	08:28	16:19	07:51	07:26	17:26	10:00	06:15	18:26	12:11
21	08:27	16:21	07:54	07:24	17:28	10:04	06:12	18:28	12:16

Day	Jan.			Feb			Mar		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
22	08:25	16:23	07:58	07:22	17:31	10:09	06:09	18:30	12:21
23	08:24	16:25	08:01	07:19	17:33	10:14	06:07	18:32	12:25
24	08:22	16:27	08:05	07:17	17:35	10:18	06:04	18:34	12:30
25	08:20	16:29	08:09	07:14	17:37	10:23	06:02	18:36	12:34
26	08:19	16:31	08:12	07:12	17:39	10:27	05:59	18:38	12:39
27	08:17	16:33	08:16	07:09	17:41	10:32	05:56	18:40	12:44
28	08:15	16:35	08:20	07:07	17:44	10:37	05:54	18:42	12:48
29	08:13	16:38	08:25				05:51	18:44	12:53
30	08:12	16:40	08:28				05:48	18:46	12:58
31	08:10	16:42	08:32				05:46	18:48	13:02
			238:16:00			268:29:00			367:49:00

Day	Apr			May			Jun		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
01	05:43	18:50	13:07	04:28	19:52	15:24	03:33	20:48	17:15
02	05:40	18:52	13:12	04:26	19:54	15:28	03:32	20:49	17:17
03	05:38	18:54	13:16	04:23	19:56	15:33	03:31	20:50	17:19
04	05:35	18:56	13:21	04:21	19:58	15:37	03:30	20:51	17:21
05	05:32	18:58	13:26	04:19	20:00	15:41	03:29	20:53	17:24
06	05:30	19:00	13:30	04:17	20:02	15:45	03:28	20:54	17:26
07	05:27	19:03	13:36	04:15	20:04	15:49	03:28	20:55	17:27
08	05:25	19:05	13:40	04:13	20:06	15:53	03:27	20:56	17:29
09	05:22	19:07	13:45	04:11	20:08	15:57	03:26	20:57	17:31
10	05:19	19:09	13:50	04:08	20:10	16:02	03:26	20:58	17:32
11	05:17	19:11	13:54	04:06	20:12	16:06	03:25	20:59	17:34
12	05:14	19:13	13:59	04:04	20:14	16:10	03:25	20:59	17:34
13	05:12	19:15	14:03	04:03	20:16	16:13	03:24	21:00	17:36
14	05:09	19:17	14:08	04:01	20:18	16:17	03:24	21:01	17:37
15	05:07	19:19	14:12	03:59	20:19	16:20	03:24	21:01	17:37
16	05:04	19:21	14:17	03:57	20:21	16:24	03:24	21:02	17:38
17	05:02	19:23	14:21	03:55	20:23	16:28	03:24	21:02	17:38
18	04:59	19:25	14:26	03:53	20:25	16:32	03:24	21:03	17:39
19	04:57	19:27	14:30	03:52	20:27	16:35	03:24	21:03	17:39
20	04:54	19:29	14:35	03:50	20:29	16:39	03:24	21:04	17:40
21	04:52	19:31	14:39	03:48	20:30	16:42	03:24	21:04	17:40
22	04:49	19:33	14:44	03:47	20:32	16:45	03:24	21:04	17:40

Day	Apr			May			Jun		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
23	04:47	19:35	14:48	03:45	20:34	16:49	03:24	21:04	17:40
24	04:44	19:38	14:54	03:44	20:35	16:51	03:25	21:04	17:39
25	04:42	19:40	14:58	03:42	20:37	16:55	03:25	21:04	17:39
26	04:40	19:42	15:02	03:41	20:39	16:58	03:26	21:04	17:38
27	04:37	19:44	15:07	03:39	20:40	17:01	03:26	21:04	17:38
28	04:35	19:46	15:11	03:38	20:42	17:04	03:27	21:03	17:36
29	04:33	19:48	15:15	03:37	20:43	17:06	03:28	21:03	17:35
30	04:30	19:50	15:20	03:35	20:45	17:10	03:28	21:03	17:35
31				03:34	20:46	17:12			
			427:06:00			507:26:00			526:33:00

Day	Jul			Aug			Sept		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
01	03:29	21:02	17:33	04:15	20:21	16:06	05:16	19:07	13:51
02	03:30	21:02	17:32	04:17	20:19	16:02	05:18	19:05	13:47
03	03:31	21:01	17:30	04:19	20:17	15:58	05:20	19:02	13:42
04	03:32	21:01	17:29	04:21	20:14	15:53	05:22	18:59	13:37
05	03:33	21:00	17:27	04:22	20:12	15:50	05:23	18:57	13:34
06	03:34	20:59	17:25	04:24	20:10	15:46	05:25	18:54	13:29
07	03:35	20:58	17:23	04:26	20:08	15:42	05:27	18:52	13:25
08	03:36	20:57	17:21	04:28	20:06	15:38	05:29	18:49	13:20
09	03:37	20:56	17:19	04:30	20:04	15:34	05:31	18:46	13:15
10	03:39	20:55	17:16	04:32	20:01	15:29	05:33	18:44	13:11
11	03:40	20:54	17:14	04:34	19:59	15:25	05:35	18:41	13:06
12	03:41	20:53	17:12	04:36	19:57	15:21	05:37	18:38	13:01
13	03:43	20:52	17:09	04:38	19:54	15:16	05:39	18:36	12:57
14	03:44	20:51	17:07	04:40	19:52	15:12	05:41	18:33	12:52
15	03:46	20:50	17:04	04:42	19:50	15:08	05:43	18:30	12:47
16	03:47	20:48	17:01	04:44	19:47	15:03	05:45	18:28	12:43
17	03:49	20:47	16:58	04:46	19:45	14:59	05:47	18:25	12:38
18	03:50	20:45	16:55	04:48	19:43	14:55	05:49	18:22	12:33
19	03:52	20:44	16:52	04:50	19:40	14:50	05:51	18:20	12:29
20	03:54	20:42	16:48	04:52	19:38	14:46	05:53	18:17	12:24
21	03:55	20:41	16:46	04:54	19:35	14:41	05:55	18:14	12:19
22	03:57	20:39	16:42	04:56	19:33	14:37	05:57	18:12	12:15

Day	Jul			Aug			Sept		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
23	03:59	20:37	16:38	04:58	19:30	14:32	05:59	18:09	12:10
24	04:00	20:36	16:36	05:00	19:28	14:28	06:01	18:06	12:05
25	04:02	20:34	16:32	05:02	19:25	14:23	06:03	18:04	12:01
26	04:04	20:32	16:28	05:04	19:23	14:19	06:05	18:01	11:56
27	04:06	20:30	16:24	05:06	19:20	14:14	06:07	17:58	11:51
28	04:07	20:28	16:21	05:08	19:18	14:10	06:09	17:56	11:47
29	04:09	20:27	16:18	05:10	19:15	14:05	06:11	17:53	11:42
30	04:11	20:25	16:14	05:12	19:12	14:00	06:13	17:50	11:37
31	04:13	20:23	16:10	05:14	19:10	13:56			
			525:44:00			466:18:00			382:24:00

Day	Oct			Nov			Dec		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
01	06:15	17:48	11:33	07:19	16:31	09:12	08:20	15:42	07:22
02	06:17	17:45	11:28	07:21	16:29	09:08	08:21	15:41	07:20
03	06:19	17:42	11:23	07:24	16:27	09:03	08:23	15:40	07:17
04	06:21	17:40	11:19	07:26	16:25	08:59	08:24	15:40	07:16
05	06:23	17:37	11:14	07:28	16:23	08:55	08:26	15:39	07:13
06	06:25	17:35	11:10	07:30	16:21	08:51	08:27	15:38	07:11
07	06:27	17:32	11:05	07:32	16:19	08:47	08:29	15:38	07:09
08	06:29	17:29	11:00	07:34	16:17	08:43	08:30	15:37	07:07
09	06:31	17:27	10:56	07:36	16:15	08:39	08:32	15:37	07:05
10	06:33	17:24	10:51	07:39	16:13	08:34	08:33	15:37	07:04
11	06:35	17:22	10:47	07:41	16:11	08:30	08:34	15:36	07:02
12	06:37	17:19	10:42	07:43	16:09	08:26	08:35	15:36	07:01
13	06:39	17:17	10:38	07:45	16:07	08:22	08:36	15:36	07:00
14	06:41	17:14	10:33	07:47	16:05	08:18	08:37	15:36	06:59
15	06:43	17:11	10:28	07:49	16:04	08:15	08:38	15:36	06:58
16	06:45	17:09	10:24	07:51	16:02	08:11	08:39	15:36	06:57
17	06:47	17:06	10:19	07:53	16:00	08:07	08:40	15:36	06:56
18	06:50	17:04	10:14	07:55	15:59	08:04	08:41	15:36	06:55
19	06:52	17:02	10:10	07:57	15:57	08:00	08:42	15:37	06:55
20	06:54	16:59	10:05	07:59	15:56	07:57	08:42	15:37	06:55
21	06:56	16:57	10:01	08:01	15:54	07:53	08:43	15:37	06:54
22	06:58	16:54	09:56	08:03	15:53	07:50	08:43	15:38	06:55

Day	Oct			Nov			Dec		
	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight	Rise	Set	Hrs of Daylight
	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m	h:m
23	07:00	16:52	09:52	08:05	15:51	07:46	08:44	15:39	06:55
24	07:02	16:50	09:48	08:07	15:50	07:43	08:44	15:39	06:55
25	07:04	16:47	09:43	08:09	15:49	07:40	08:44	15:40	06:56
26	07:06	16:45	09:39	08:11	15:47	07:36	08:45	15:41	06:56
27	07:09	16:43	09:34	08:13	15:46	07:33	08:45	15:42	06:57
28	07:11	16:40	09:29	08:14	15:45	07:31	08:45	15:42	06:57
29	07:13	16:38	09:25	08:16	15:44	07:28	08:45	15:43	06:58
30	07:15	16:36	09:21	08:18	15:43	07:25	08:45	15:44	06:59
31	07:17	16:33	09:16				08:45	15:46	07:01
			322:23:00			247:26:00			218:05:00

Source: http://aa.usno.navy.mil/data/docs/RS_OneYear.php

Table A14.3 Calculations for the percentage of bright sunshine each month for Fife

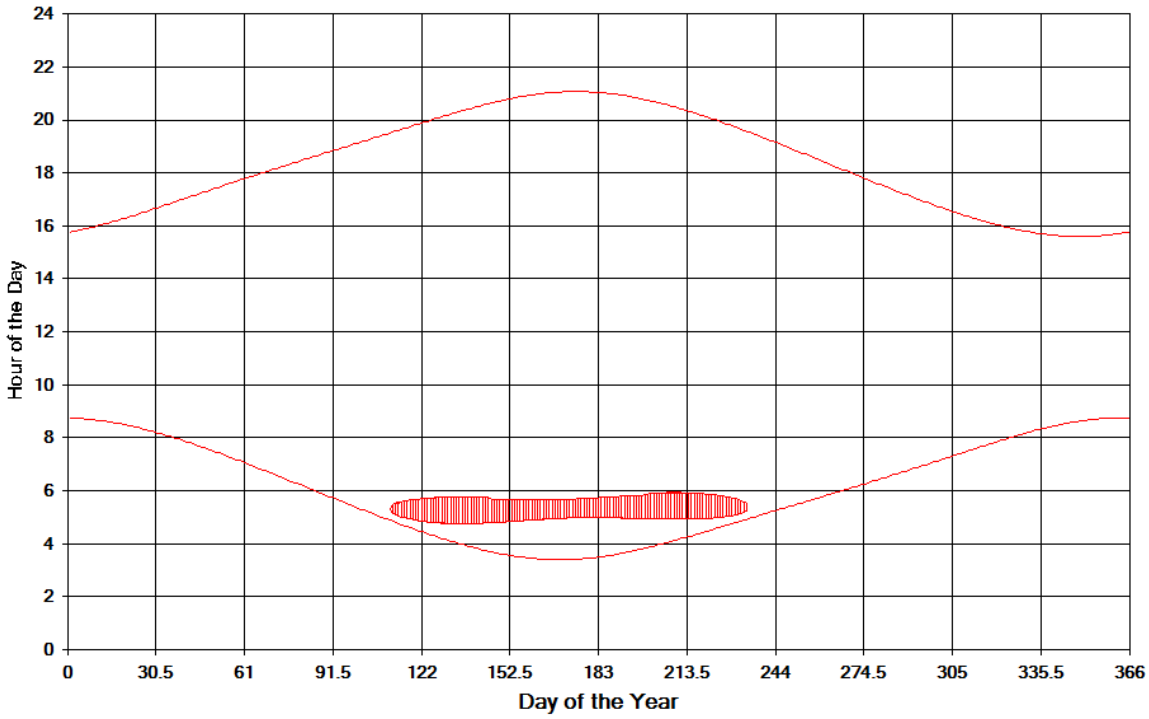
Month	Bright Sunshine hours per month (2000 -2011)	Hours of daylight each month	RATIO = Average bright sunshine hours per month / Hours of Daylight per month	Percentage of bright sunshine
January	63	238.16	0.26	26
February	85	268.29	0.32	32
March	127	367.49	0.35	35
April	165	427.06	0.39	39
May	207	507.26	0.41	41
June	172	526.33	0.33	33
July	166	525.44	0.32	32
August	153	466.18	0.33	33
September	131	382.24	0.34	34
October	99	322.23	0.31	31
November	83	247.26	0.34	34
December	54	218.05	0.25	25

14.3 Results for the Assessment Locations

14.3.1 Lady Wynd

Chart A14.1 shows the times that shadow flicker have been predicted to occur at Lady Wynd on a north and east-facing windows. As shown on the graph, the effects could occur for short periods from late April, through the months of May, June and July until mid-August during early mornings (sunrise hours).

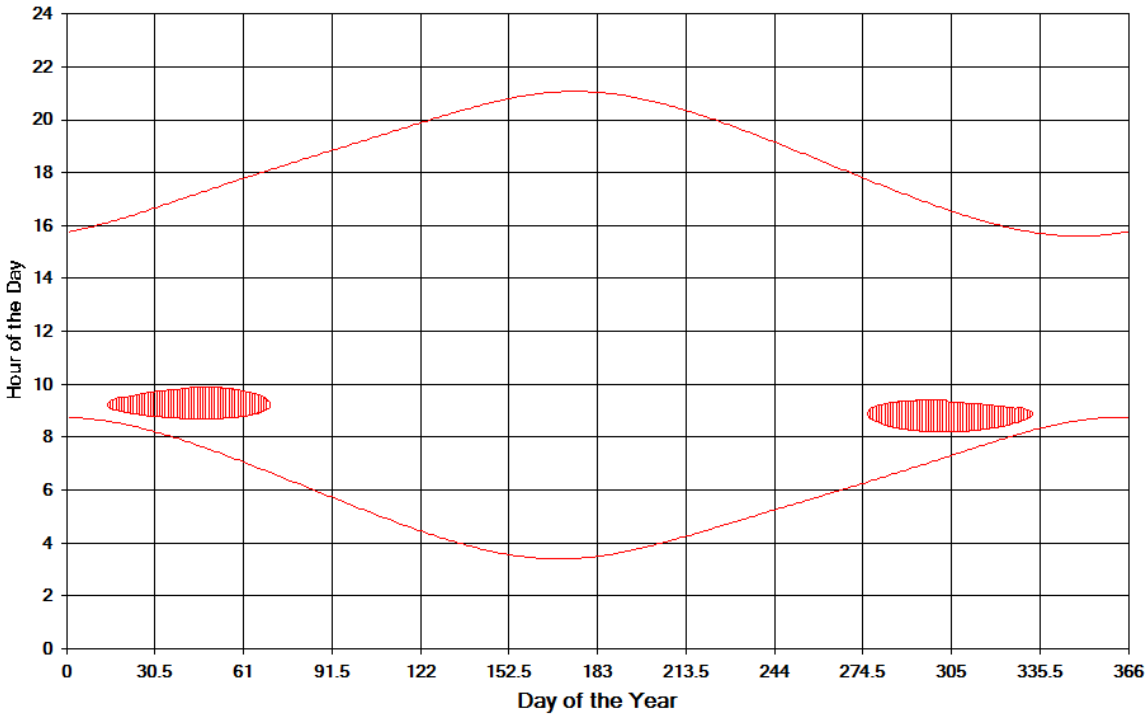
Chart A14.1 Predicted Shadow Flicker Times at Location 1, Lady Wynd



14.3.2 Wellesley Road

Chart A14.2 shows the times that shadow flicker have been predicted to occur at Wellesley Road on an east and south-facing windows. As shown on the graph, the effects could occur for short periods from late January to early March and from October to late-November during the mornings.

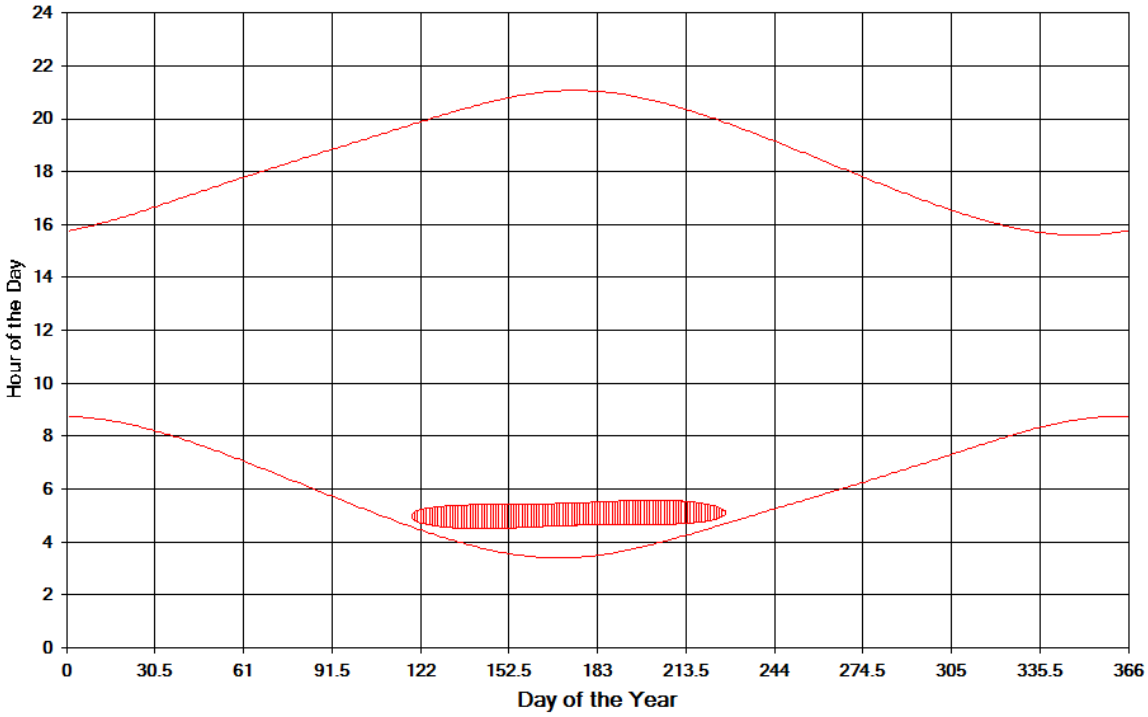
Chart A14.2 Predicted Shadow Flicker Times at Location 2, Wellesley Road



14.3.3 Bethune Way

Chart A14.3 shows the times that shadow flicker have been predicted to occur at Bethune Way on north and east-facing windows. As shown on the graph, the effects could occur for short periods from May to Mid-August during the early mornings (sunrise hours).

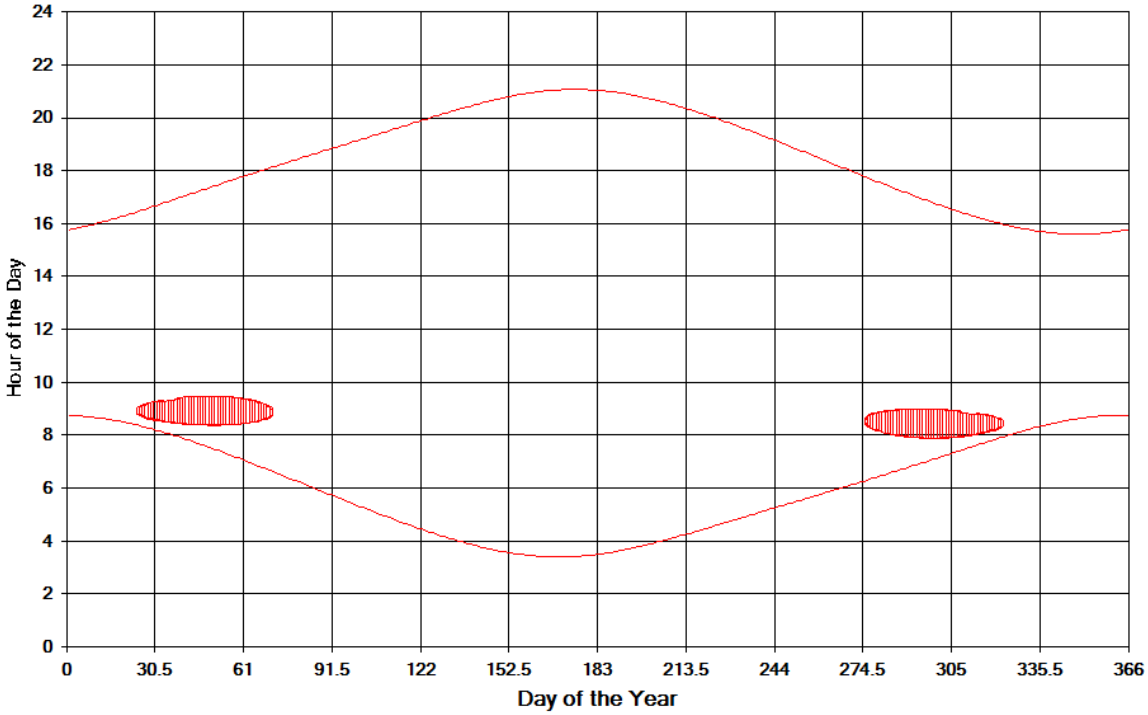
Chart A14.3 Predicted Shadow Flicker Times at Location 3, Bethune Way



14.3.4 Randolph Wemyss Memorial Hospital

Chart A14.4 shows the times that shadow flicker have been predicted to occur at Randolph Wemyss Memorial Hospital east and south-facing windows. As shown on the graph, the effects could occur for short periods from late January to early March and end September to mid-November during the mornings.

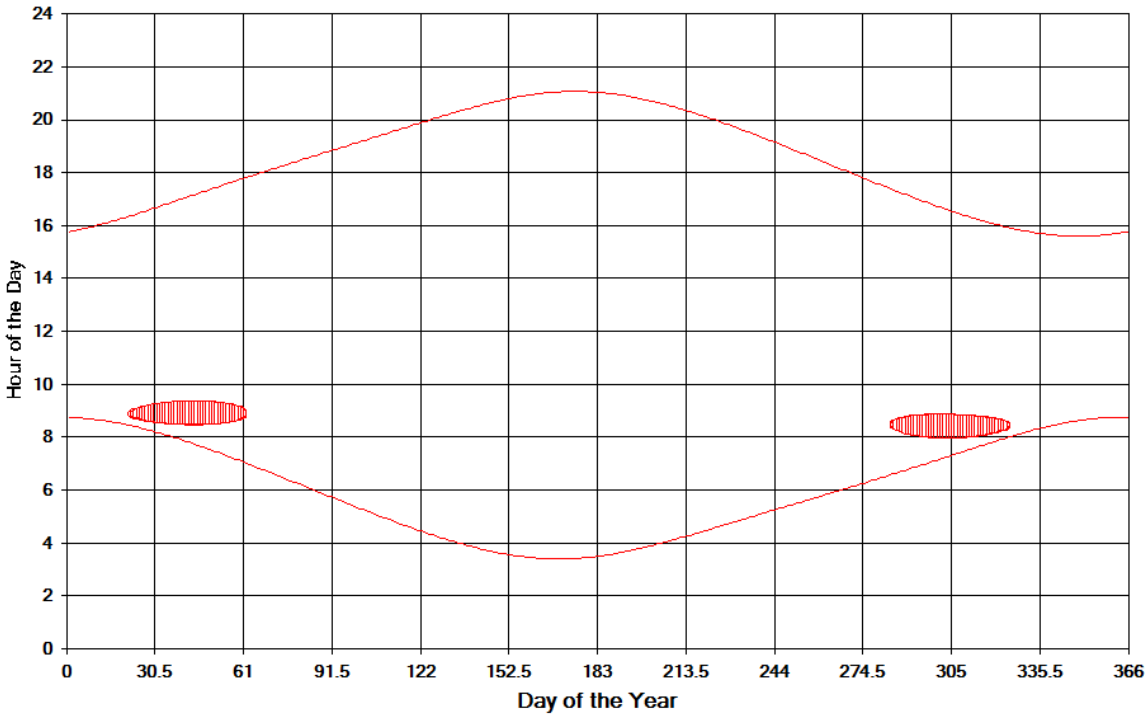
Chart A14.4 Predicted Shadow Flicker Times at Randolph Wemyss Memorial Hospital



14.3.5 Denbeath Primary School

Chart A14.5 shows the times that shadow flicker have been predicted to occur at Denbeath Primary School east and south-facing windows. As shown on the graph, the effects could occur for short periods from the end January to the start March and mid-October to mid-November during the mornings.

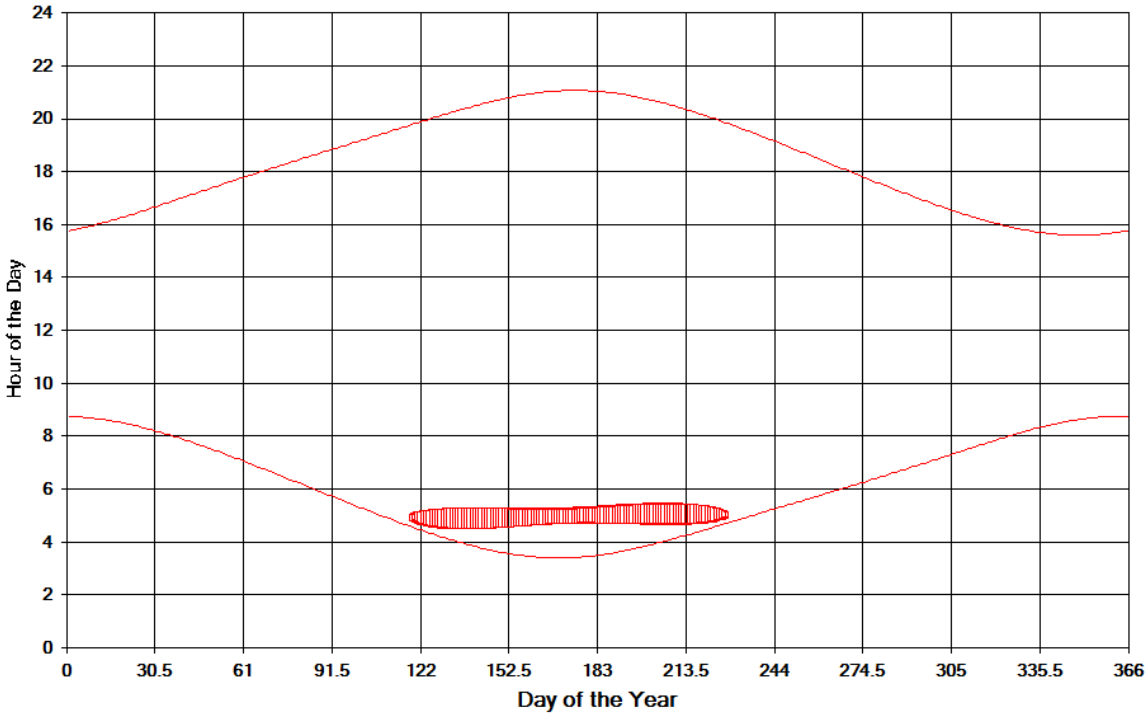
Chart A14.5 Predicted Shadow Flicker Times at Denbeath Primary School



14.3.6 Anderson Lane

Chart A14.6 shows the times that shadow flicker have been predicted to occur at Anderson Lane north and east-facing windows. As shown on the graph, the effects could occur for short periods from the end April to mid-August during the early mornings (sunrise hours).

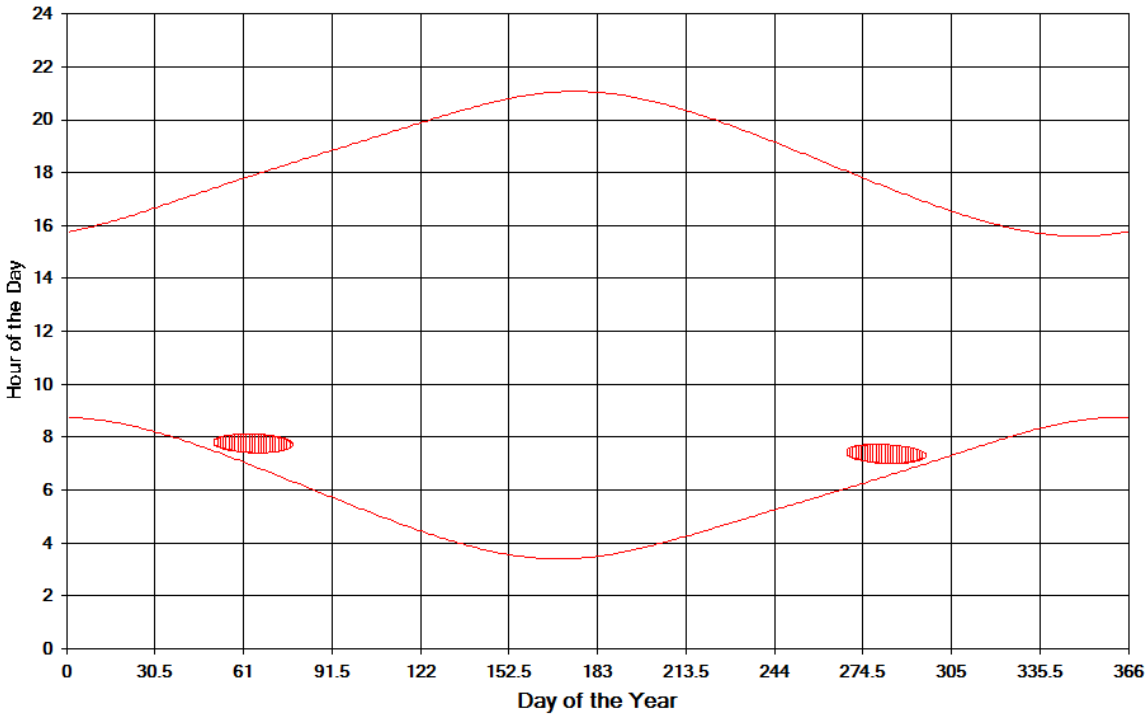
Chart A14.6 Predicted Shadow Flicker Times at Location 4, Anderson Lane



14.3.7 Den Walk

Chart A14.7 shows the times that shadow flicker have been predicted to occur Den Walk east and south-facing windows. As shown on the graph, the effects could occur for short periods from late February to mid-March and late September to late October during the early mornings.

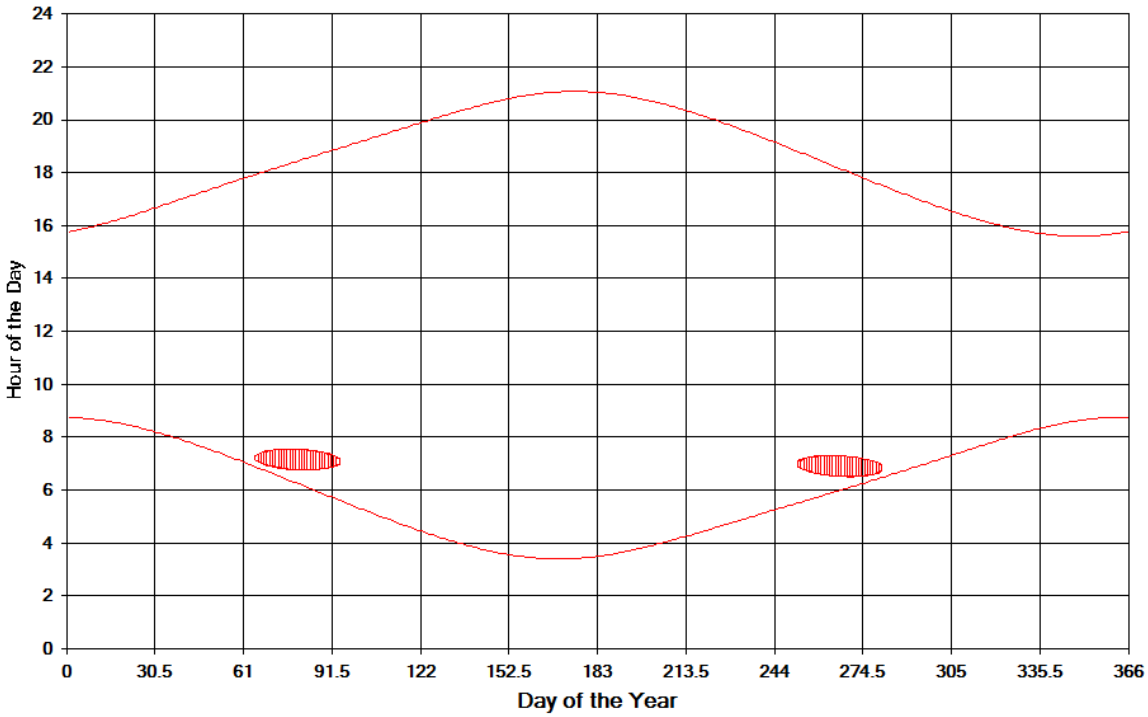
Chart A14.7 Predicted Shadow Flicker Times at Location 4, Location 5, Den Walk



14.3.8 Omar Crescent

Chart A14.8 shows the times that shadow flicker have been predicted to Omar Crescent east and south-facing windows. As shown on the graph, the effects could occur for short periods from early March to start April and early September to start October during the early mornings.

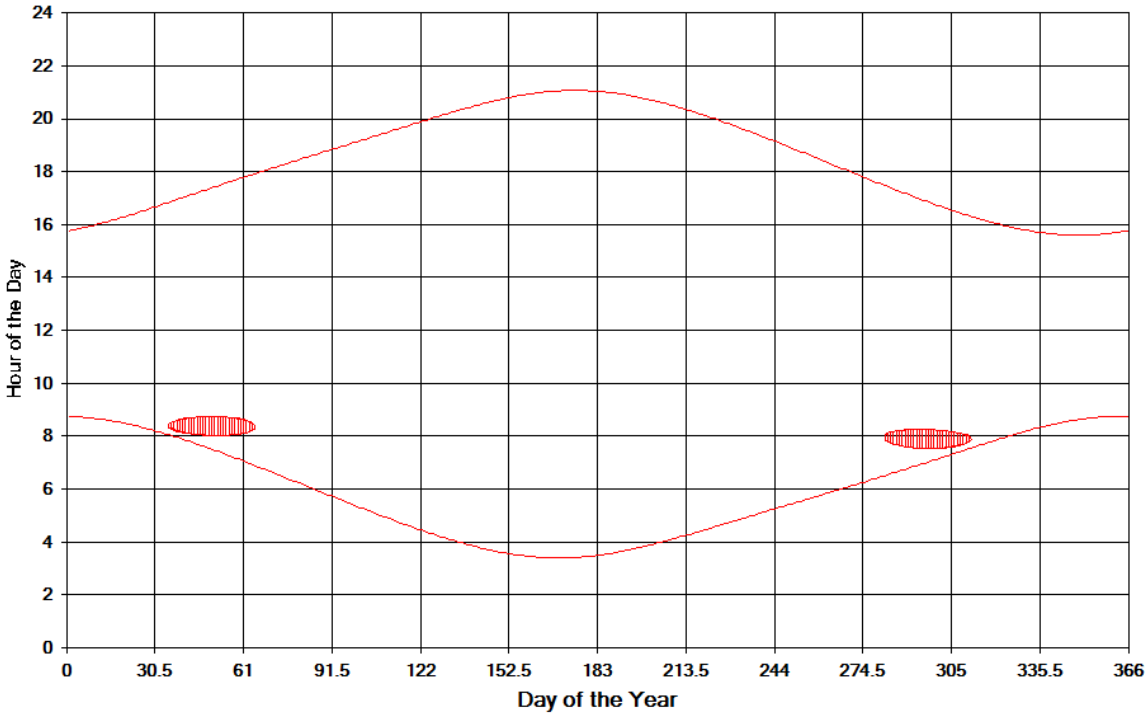
Chart A14.8 Predicted Shadow Flicker Times at Location 6, Omar Crescent



14.3.9 Den Walk

Chart A14.9 shows the times that shadow flicker have been predicted to Den Walk east and south-facing windows. As shown on the graph, the effects could occur for short periods from early February to early March and early October to early November during the mornings.

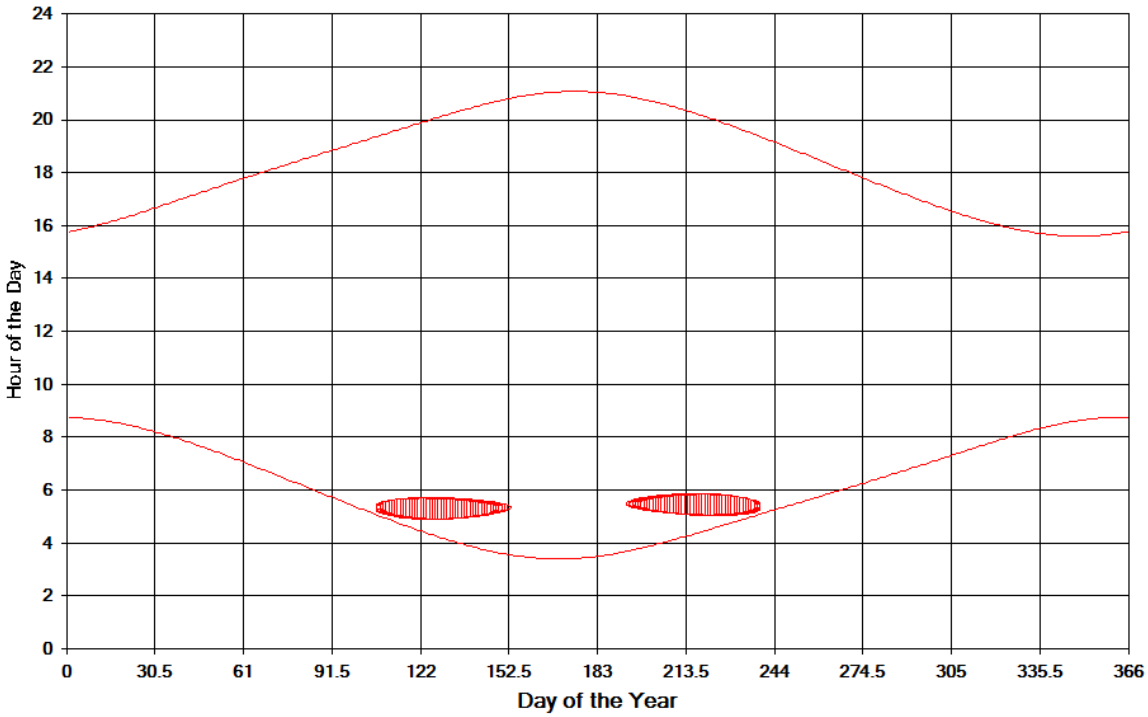
Chart A14.9 Predicted Shadow Flicker Times at Location 7, Den Walk



14.3.10 Braehead Gardens

Chart A14.10 shows the times that shadow flicker have been predicted to Braehead Gardens north and east-facing windows. As shown on the graph, the effects could occur for short periods from mid-April to end May and mid-July to end August during the early mornings (sunrise hours).

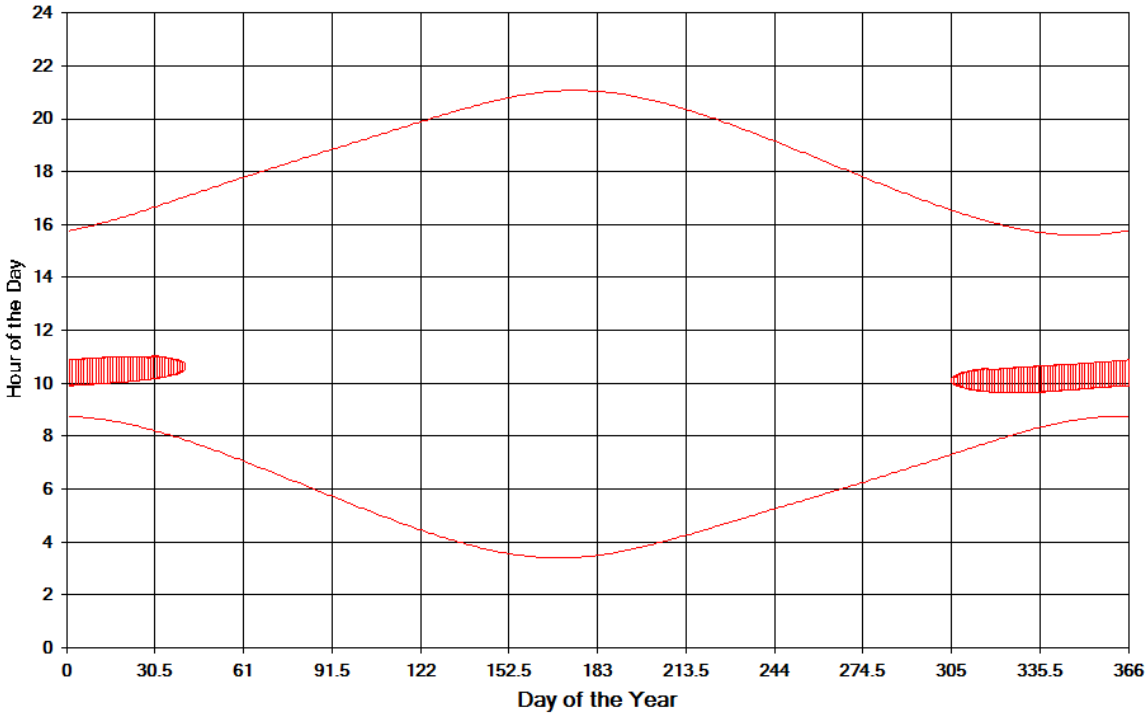
Chart A14.10 Predicted Shadow Flicker Times at Location 8, Braehead Gardens



14.3.11 Clyde Street

Chart A14.11 shows the times that shadow flicker have been predicted Clyde Street east and south-facing windows. As shown on the graph, the effects could occur for short periods from end October to start February during the mornings.

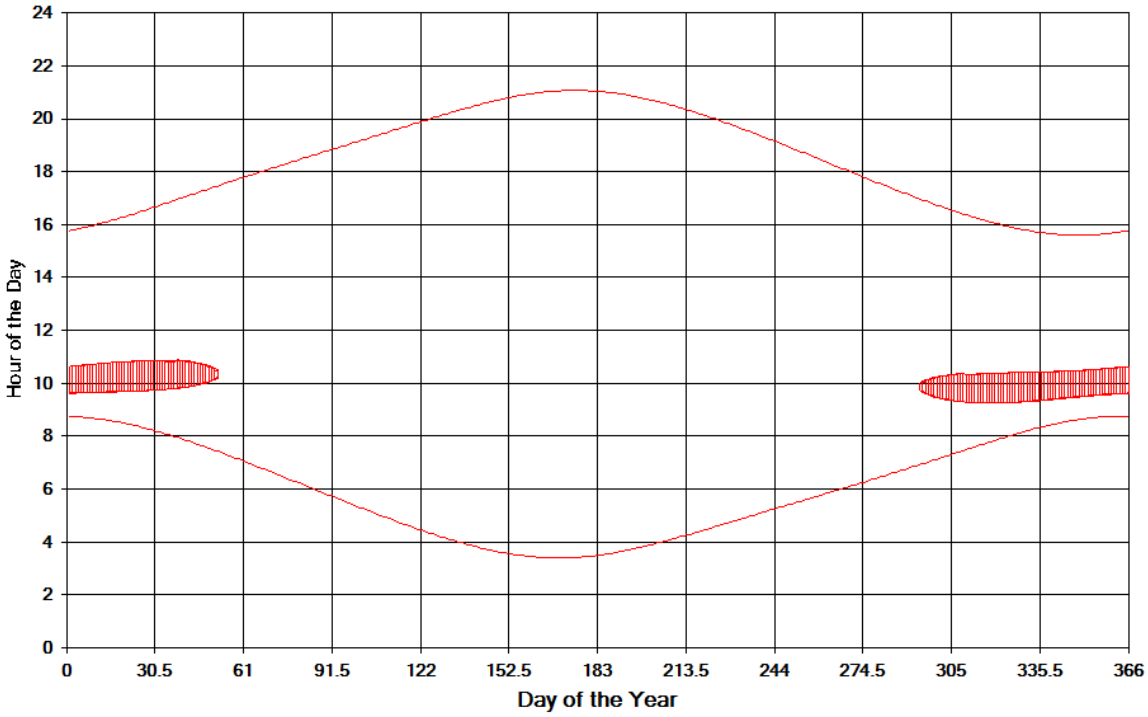
Chart A14.11 Predicted Shadow Flicker Times at Location 9, Clyde Street



14.3.12 Wellesley Road

Chart A14.12 shows the times that shadow flicker have been predicted Wellesley Road east and south-facing windows. As shown on the graph, the effects could occur for short periods from mid-October to mid-February during the mornings.

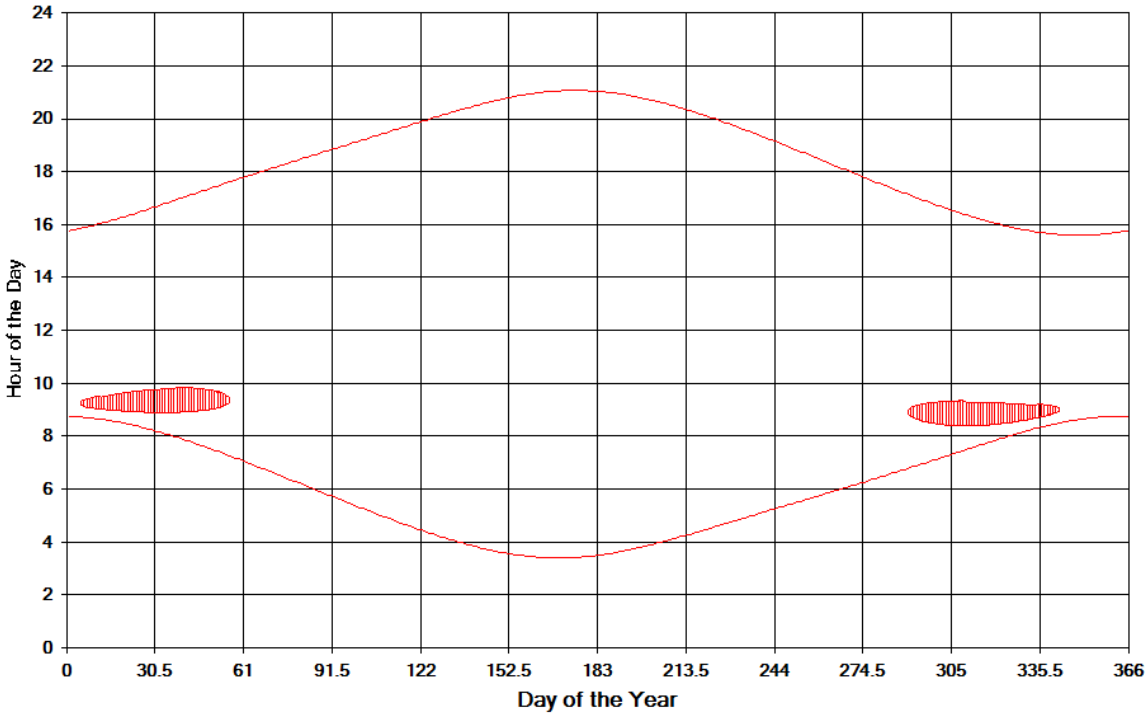
Chart A14.12 Predicted Shadow Flicker Times at Location 10, Wellesley Road



14.3.13 Ward Street

Chart A14.13 shows the times that shadow flicker have been predicted Ward Street east and south-facing windows. As shown on the graph, the effects could occur for short periods from mid-January to late-February and mid-October to end November during the mornings.

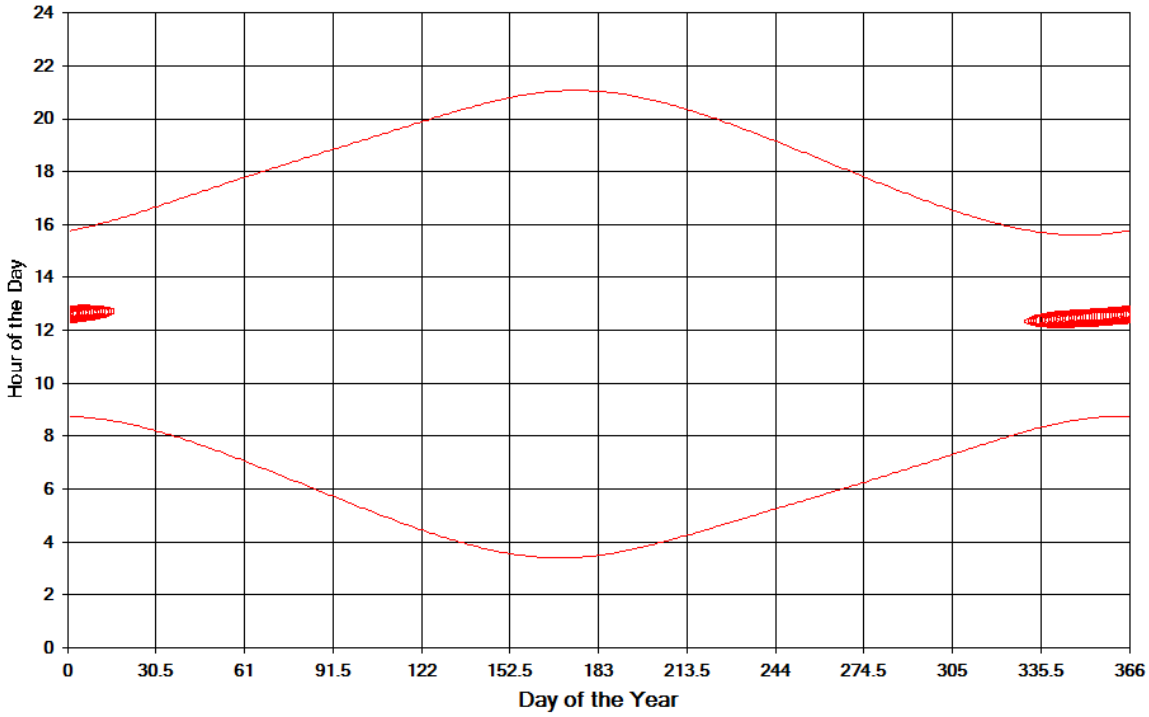
Chart A14.13 Predicted Shadow Flicker Times at Location 11, Ward Street



14.3.14 Swan Court

Chart A14.14 shows the times that shadow flicker have been predicted Swan Court south and west-facing windows. As shown on the graph, the effects could occur for short periods from end November to mid-January during the early afternoon.

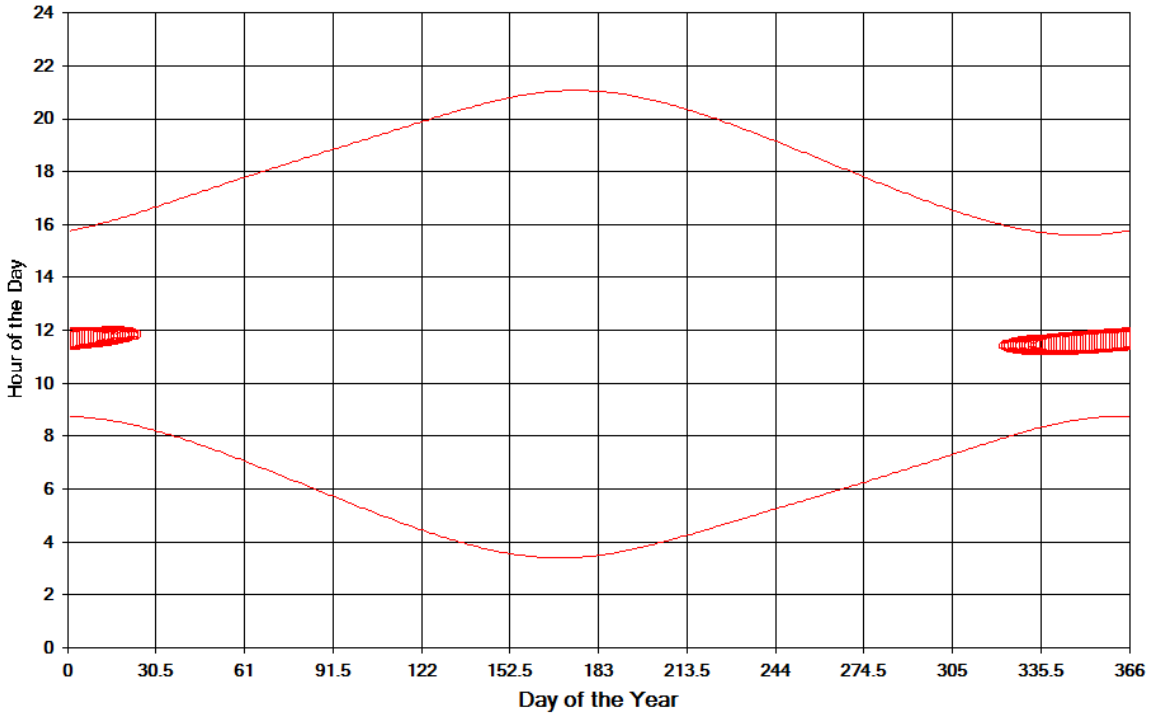
Chart A14.14 Predicted Shadow Flicker Times at Location 12, Swan Court



14.3.15 Swan View

Chart A14.15 shows the times that shadow flicker have been predicted Swan View east and west-facing windows. As shown on the graph, the effects could occur for short periods from mid- November to late-January during the late morning.

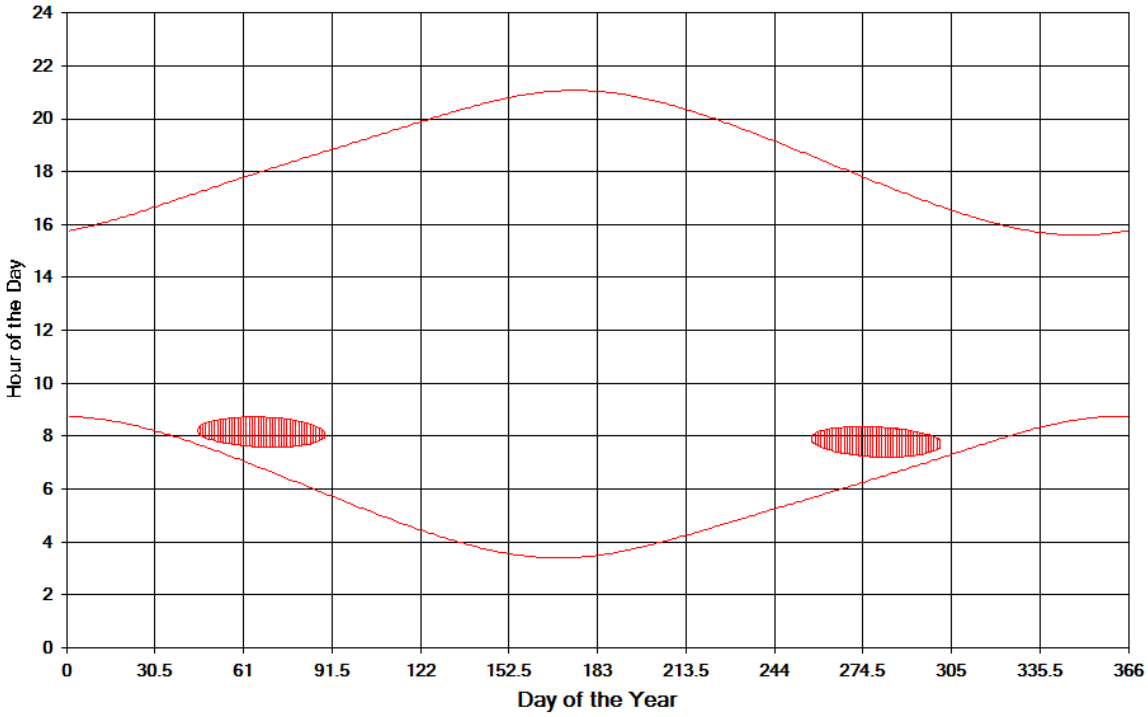
Chart A14.15 Predicted Shadow Flicker Times at Location 13, Swan View



14.3.16 Wellesley Road

Chart A14.16 shows the times that shadow flicker have been predicted Wellesley Road east and south-facing windows. As shown on the graph, the effects could occur for short periods from mid-February to end March and mid-September to mid-October during the morning.

Chart A14.16 Predicted Shadow Flicker Times at Location 14, Wellesley Road

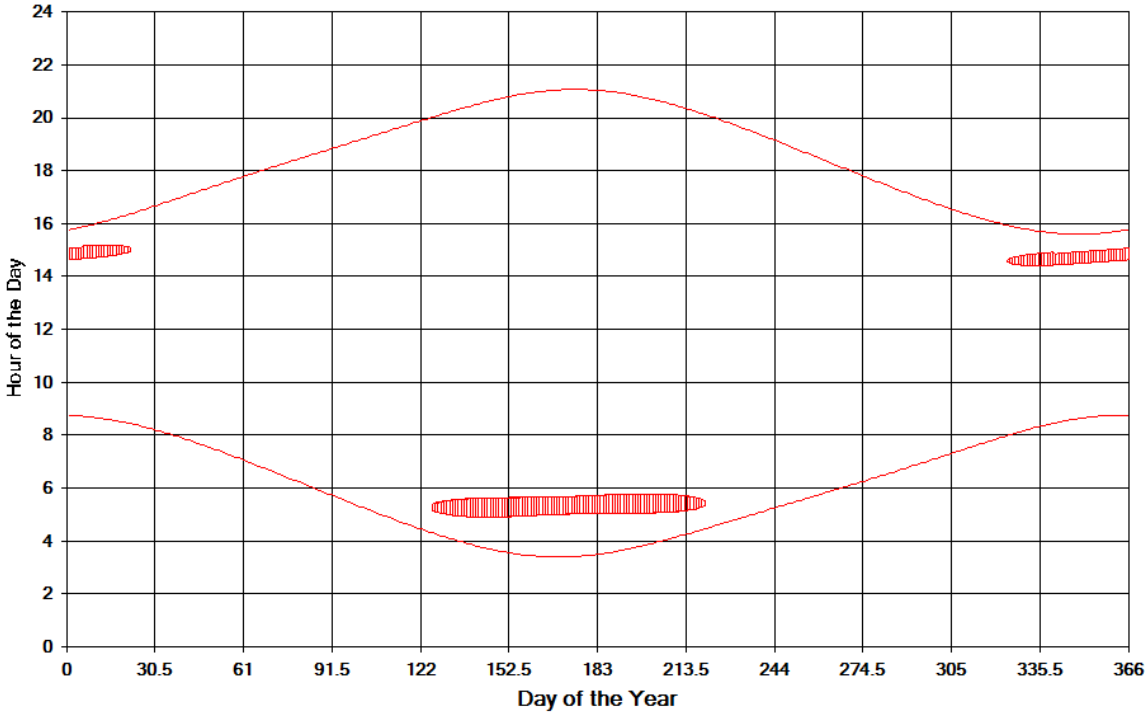


14.4 Results for the Cumulative Assessment Locations

14.4.1 Wemyss Place

Chart A14.17 shows the times that cumulative shadow flicker have been predicted to occur at Wemyss Place on north, east, south and west -facing windows. As shown on the graph, the effects could occur for short periods from early May to early August and mid-November to end January during early morning (sunrise hours) and mid-afternoon.

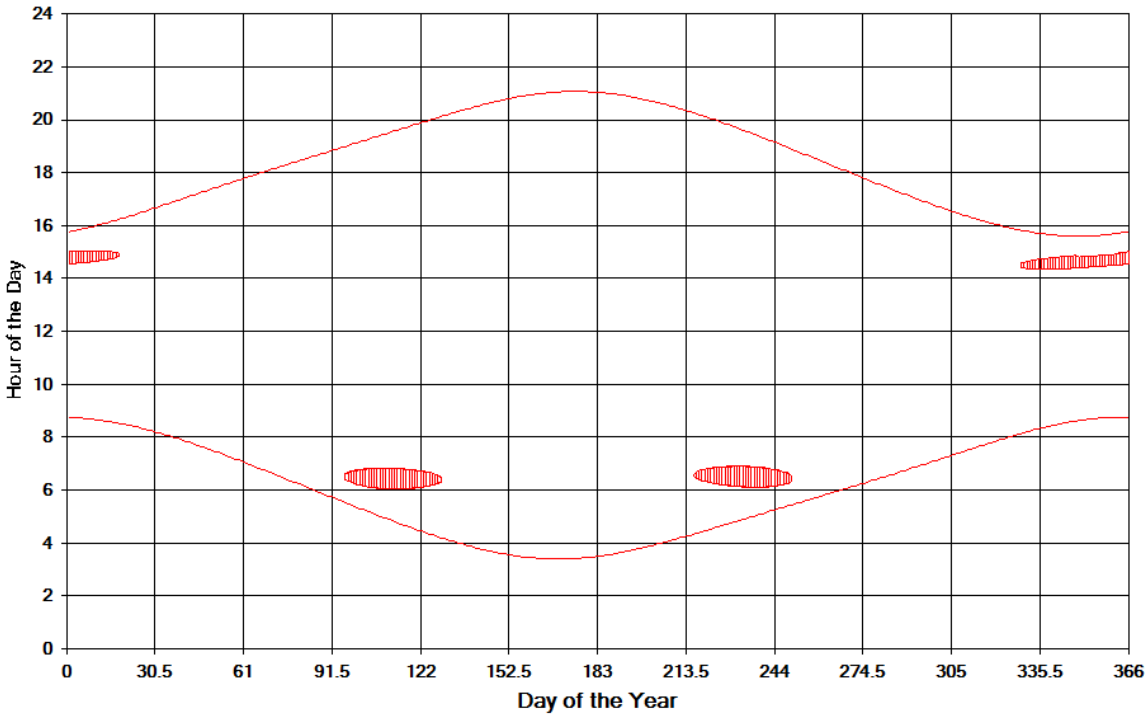
Chart A14.17 Predicted Shadow Flicker Times at Wemyss Place



14.4.2 Pinpoint Ltd

Chart A14.18 shows the times that cumulative shadow flicker have been predicted to occur at Pinpoint Ltd on north, east, south and west -facing windows. As shown on the graph, the effects could occur for short periods from early April to early May and early August to early September and end November to mid-January during early morning and mid-afternoon.

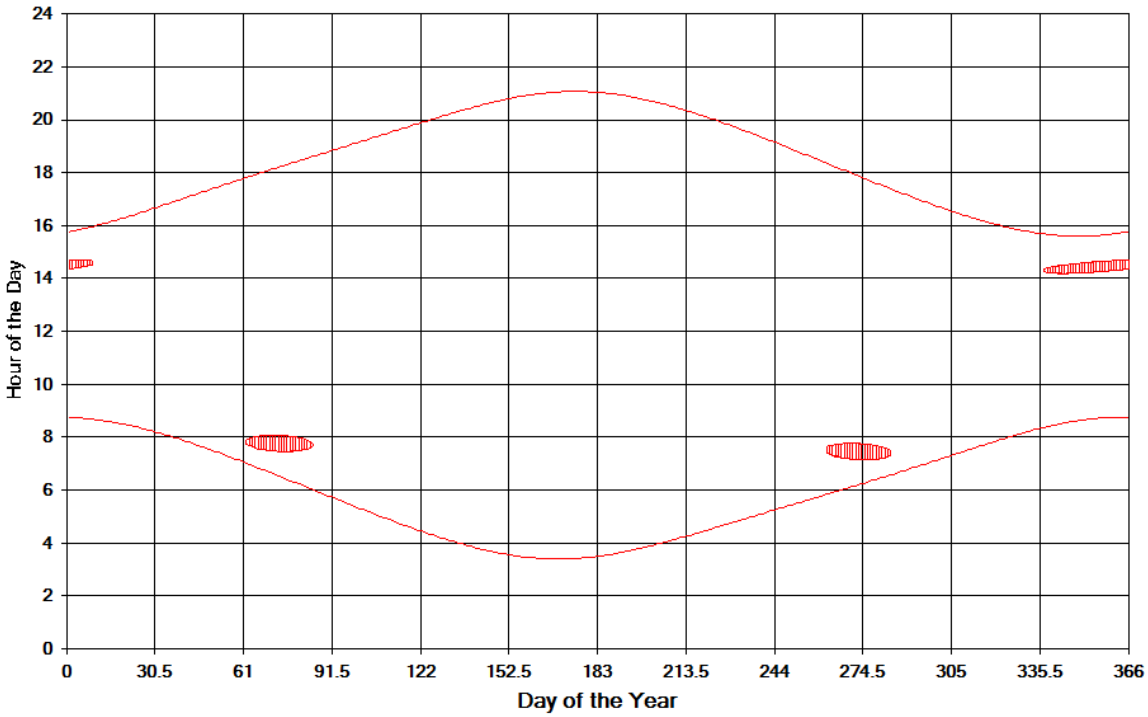
Chart A14.18 Predicted Shadow Flicker Times at Pinpoint Ltd



14.4.3 Harbour View

Chart A14.19 shows the times that cumulative shadow flicker have been predicted to occur at Harbour View on east, south and west -facing windows. As shown on the graph, the effects could occur for short periods from start March to late March, mid-September to mid-October and start December to mid-January during morning and mid-afternoon.

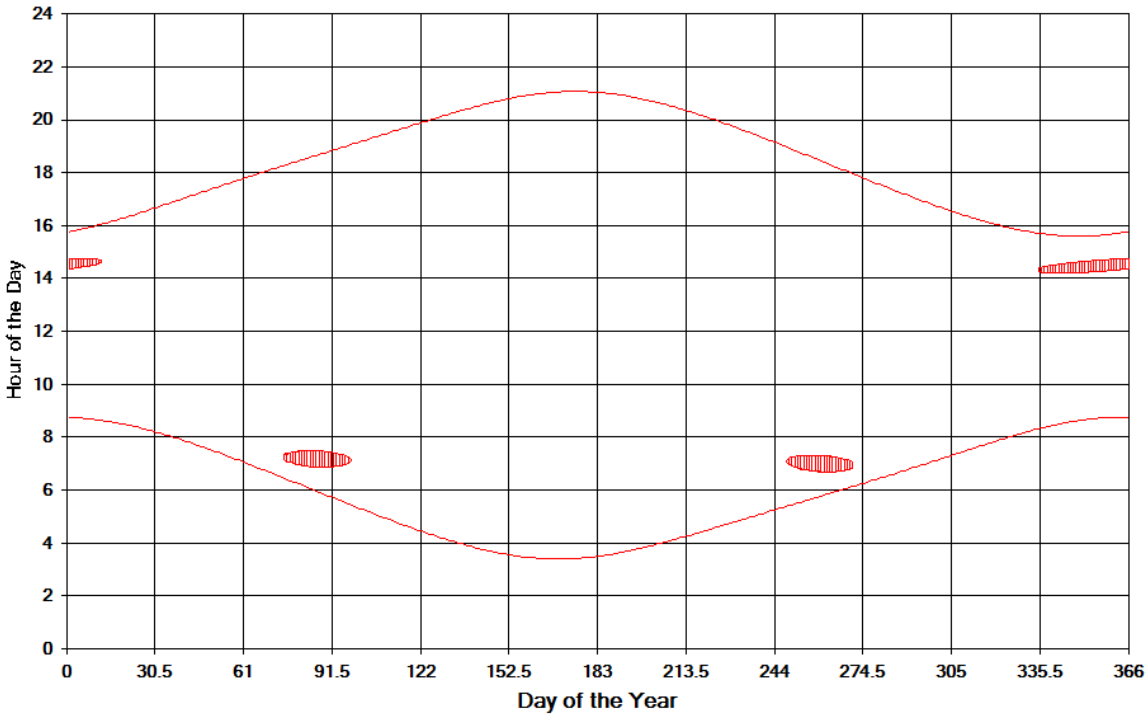
Chart A14.19 Predicted Shadow Flicker Times at Harbour View



14.4.4 High Street

Chart A14.20 shows the times that cumulative shadow flicker have been predicted to occur at High Street on east, south and west -facing windows. As shown on the graph, the effects could occur for short periods from mid-March to early April, early September to late September and start December to mid-January during early morning and mid-afternoon.

Chart A14.20 Predicted Shadow Flicker Times at High Street



14.4.5 South Street

Chart A14.21 shows the times that cumulative shadow flicker have been predicted to occur at South Street on east, south and west -facing windows. As shown on the graph, the effects could occur for short periods from late March to start April, early September to mid-September and early December to start January during early morning and mid-afternoon.

Chart A14.21 Predicted Shadow Flicker Times at South Street