APPENDIX 13-5

DESIGN EVOLUTION AND EMBEDDED LVIA MITIGATION

Appendix 13-5: Design Evolution and Embedded LVIA Mitigation

Overview: How Landscape and Visual Assessments have shaped the Design of the Proposed Project

Landscape and Visual Impact Assessment (LVIA) has been a key consideration through the iterative design of the Proposed Project. This Appendix presents this chronological design evolution of the turbine layout and supporting infrastructure, illustrating how detailed landscape and visual surveys and assessment work undertaken since 2020 has progressively informed the design through embedding mitigation into the Proposed Project.

Under national policy and imperatives, there is a need to utilise the significant scale of the highly suitable landscape resource of the Project Site for the generation of as much renewable energy as possible. This needs to be balanced with the requirement for sustainable, appropriate and acceptable environmental impacts. Given the very large scale of the Proposed Project, the likelihood of significant impacts on landscape and visual receptors is very high. As far as is reasonably possible, all appropriate measures have been implemented to mitigate the extent and significance of these potential landscape and visual effects whilst maximising the use of this significant landscape resource.

This document includes mapping, visualisations and extracts from previous LVIA studies to demonstrate how landscape and visual mitigation is embedded within the Proposed Project. This Appendix covers the following key topics and the resultant design interventions arising from the findings of LVIA conducted over the past 6 years.

- Residential Receptors: Set Back Distances and Avoidance of Surrounding Effects
- Two Turbine Tip Heights: Lower Turbines around the Outer Perimeter of the Proposed Wind Farm near Sensitive receptors.
- Overall Visual Coherence: Omission of visually disconnected turbines to mitigate discordant and surrounding visual effects.
- Grand Canal Mitigation: Implementation of Appropriate setback from sensitive landscape and visual receptors.
- Best Practice Design (WEDG): Alignment with Guidance for the design of Wind Farms in Flat Peatland Landscape Types

Residential Visual Amenity (RVIA) Assessment – 2020 RVA Study

- What: An assessment of potential effects on residential receptors in key areas surrounding the Proposed Wind Farm on the initial 59 turbines at 220m tip height (See Chapter 3 of the EIAR for further detail)
- LVIA Study informed by spatial analysis, site visits and verified photomontage visualisations (10 No. Viewpoints)



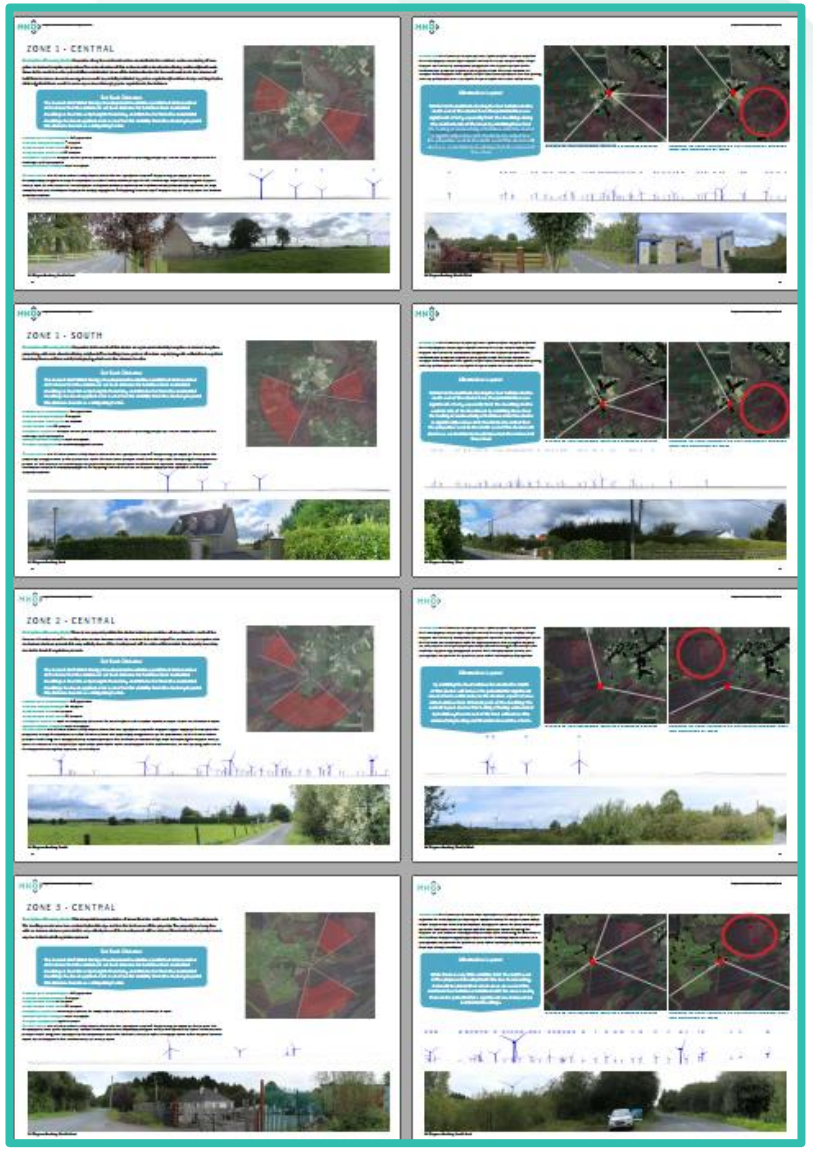


*Image Extracts from 2020 LVIA Study. **NOT** current Turbine Layout and Design*

Residential Receptors – Key Findings - 2020 RVIA Study

Key Findings of 2020 RVA Study

- Due to flat landscape characteristics and mature boundary vegetation surrounding the Proposed Wind Farm there is limited visibility of approx. >15 turbines from any group of residential receptors.
- Potential for ‘Surrounding Effects’ in the Townland of Lullymore with views of turbines in two separate directions from a linear arrangement of residential receptors on the R414 Regional Road (discussed further on next page).

Example: Limited Visibility of many turbines from any given location representing closest residential receptors

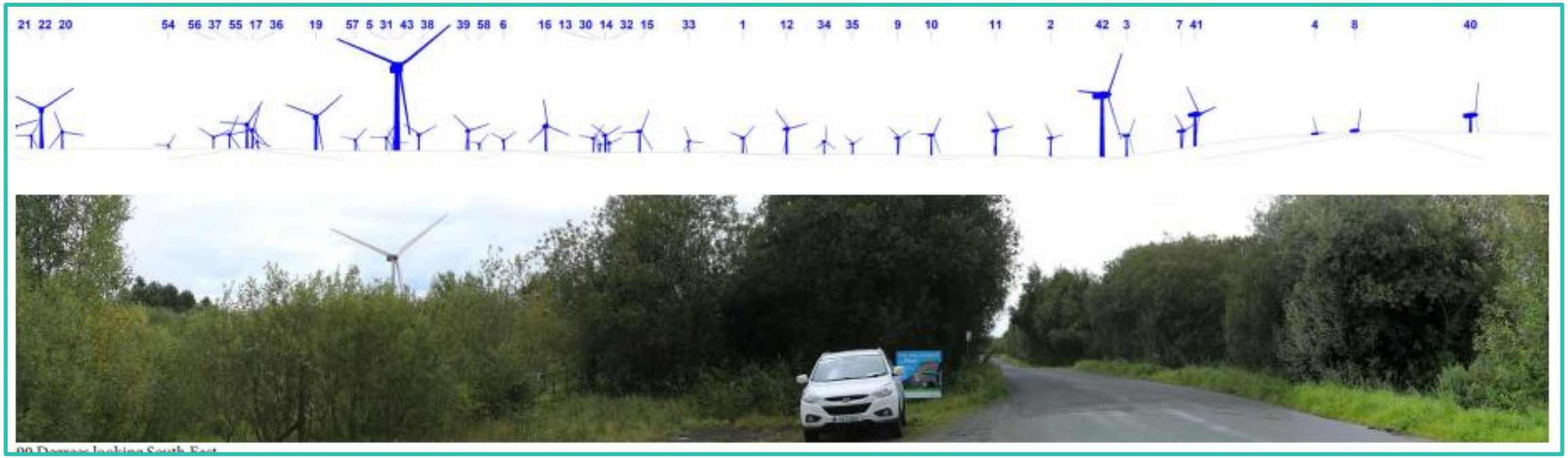


**Image Extracts from 2020 LVIA Study. Not current Turbine Layout and Design of the Proposed Project*

2021 LVIA Design Analysis Study

- What: Turbine Tip Height Analysis, Assessment of turbine arrangement from key sensitive visual receptors and vantage points
- LVIA Study informed by spatial analysis, site visits and verified photomontage visualisations from 16 No. Viewpoints (11-27 at this time)

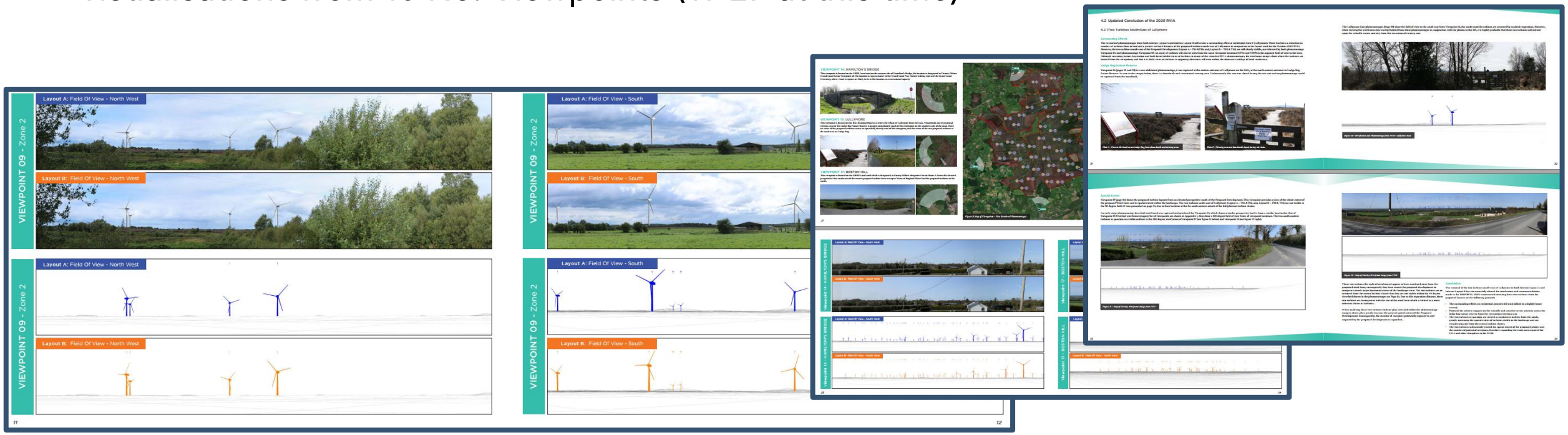
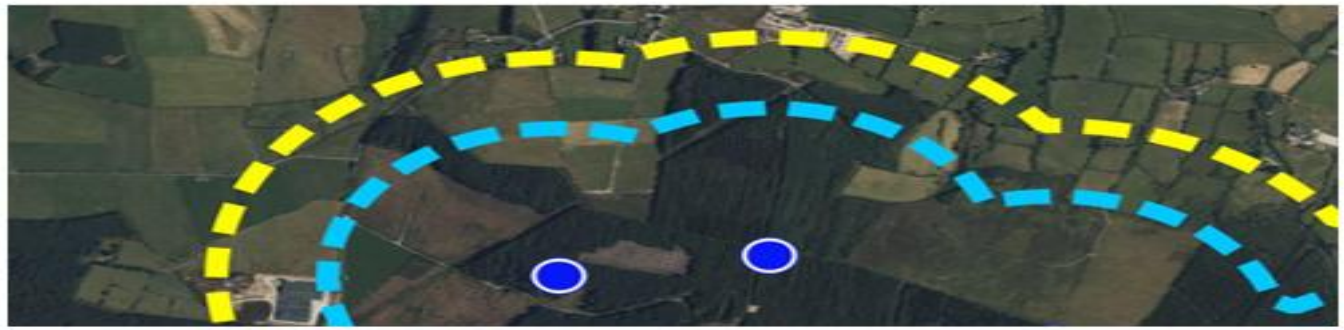


Image Extracts from 2021 LVIA Study.* ***NOT* *current Turbine Layout and Design of the Proposed Project*

Residential Receptors – Mitigation Interventions – Result of 2020 and 2021 Studies

Mitigation Interventions

- Adherence to benchmark best-practice setback distances from residential receptors(4X Tip Height Set back Distance from residential receptors in the Draft WEDG, 2019)
- Proposed omission of 2 No. turbines in Lodge Bog (part of 2020 layout) to the south-east of Lullymore, and proposed omission of further 2 No. turbines in Lodge Bog (part of 2021 layout) to avoid potential surrounding effects on residential visual amenity – Proposed Omission of a total of 4 No. turbines total in Lodge Bog.



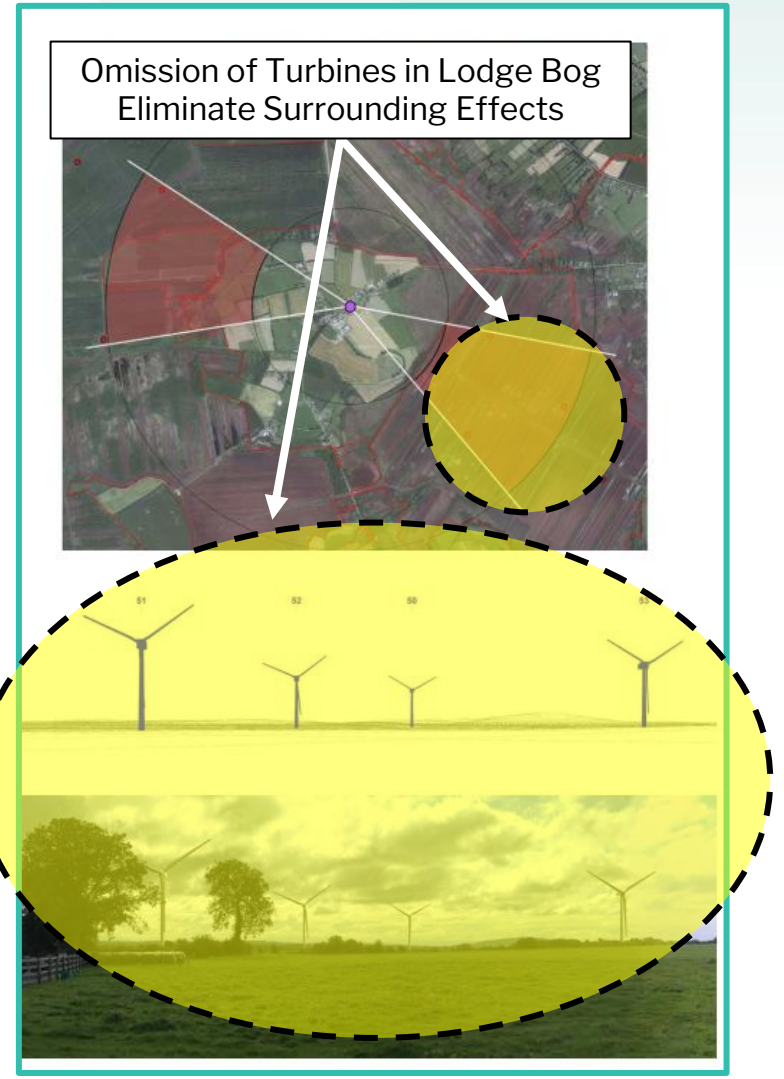
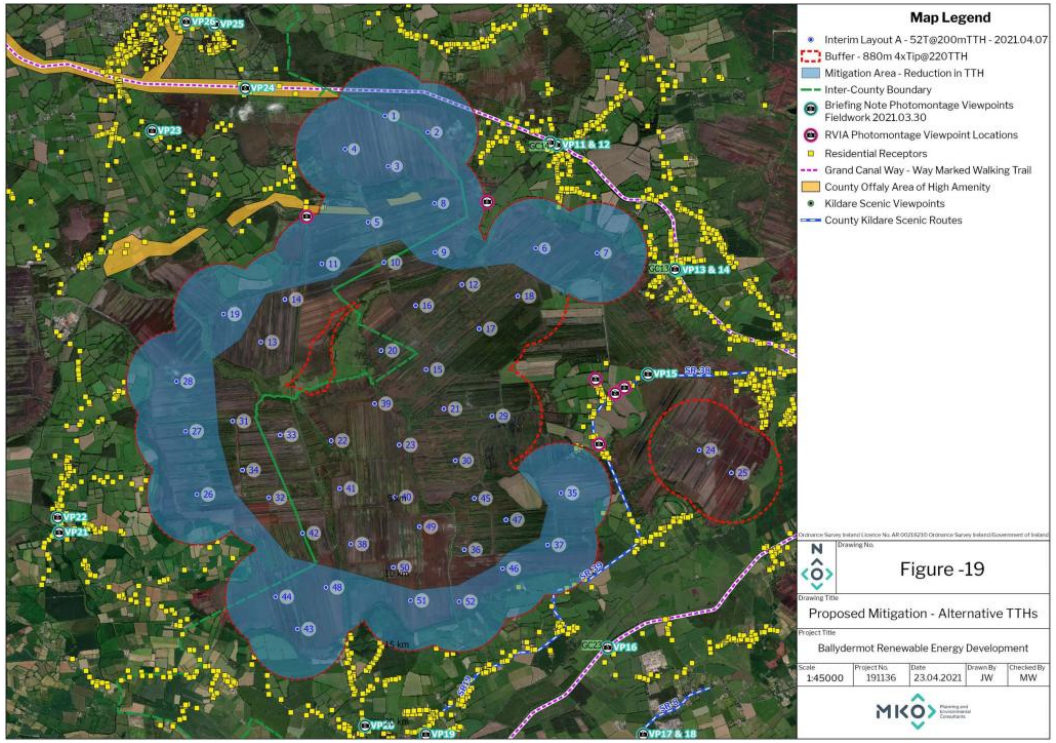


Image Extracts from 2020 LVIA Study.* ***NOT* *current Turbine Layout and Design of the Proposed Project*

Tip Height Analysis: Two Turbine Tip Heights with Lower Turbines around the Outer Perimeter (2021 - LVIA Design Analysis Study)



Mitigation Area - Reduction in TTH

What: An assessment to review the 2 different proposed tip heights (200m and 220m). The findings of this assessment subsequently informed the decision to adopt two different turbine tip heights (200m and 220m) within the layout, as a form of embedded LVIA mitigation.

Key Finding:

- Scale of turbine tip height is most relevant for turbines at the outer periphery of the Proposed Wind Farm near the surrounding sensitive receptors (e.g. residents and nearby recreational amenities).
- Lower tip height around the perimeter of the Proposed Wind Farm site reduces the potential for visual dominance and allows these outer turbines to take greater advantage of existing visual screening within the landscape, such as intervening landform and vegetation
- Differences in tip height between the outer and inner turbines and centre of the Proposed Wind Farm are not readily discernible and are visually acceptable and when seen from both proximate receptors as well as more distant elevated vantage points.

Design Intervention:

- The layout deliberately adopts two turbine tip heights as LVIA mitigation. The Proposed Turbines at the outer perimeter of the Proposed Wind Farm, which are closest to surrounding visual receptors, have a tip height of 200m, while those turbines toward the centre rise to 220m.
- This graduated profile balances the need to maximise the renewable energy yield of this suitable landscape resource and ensure impact of turbine scale are less for nearby sensitive receptors.

Image Extracts from 2021 LVIA Study. **NOT current Turbine Layout and Design of the Proposed Project*

Omission of the 4 No. turbines in Lodge Bog – Mitigation for other visual receptors

- The Omission of the 4 No. turbines in Lodge Bog, whilst implemented primarily to mitigate surrounding visual effects for residential receptors at Lullymore (as discussed previously), also provides further visual mitigation benefits:
  - The removal of these turbines mitigates discordant visual effects from scenic vistas and elevated vantage points to the south and east of the Project Site.
  - The removal of these turbines reduces the horizontal extent of turbines when viewed from vantage points to the north, east, and south.
  - The removal of these turbines mitigates impacts on long-ranging scenic vistas towards the Chair of Kildare to the south and south-east of the Proposed Turbines.

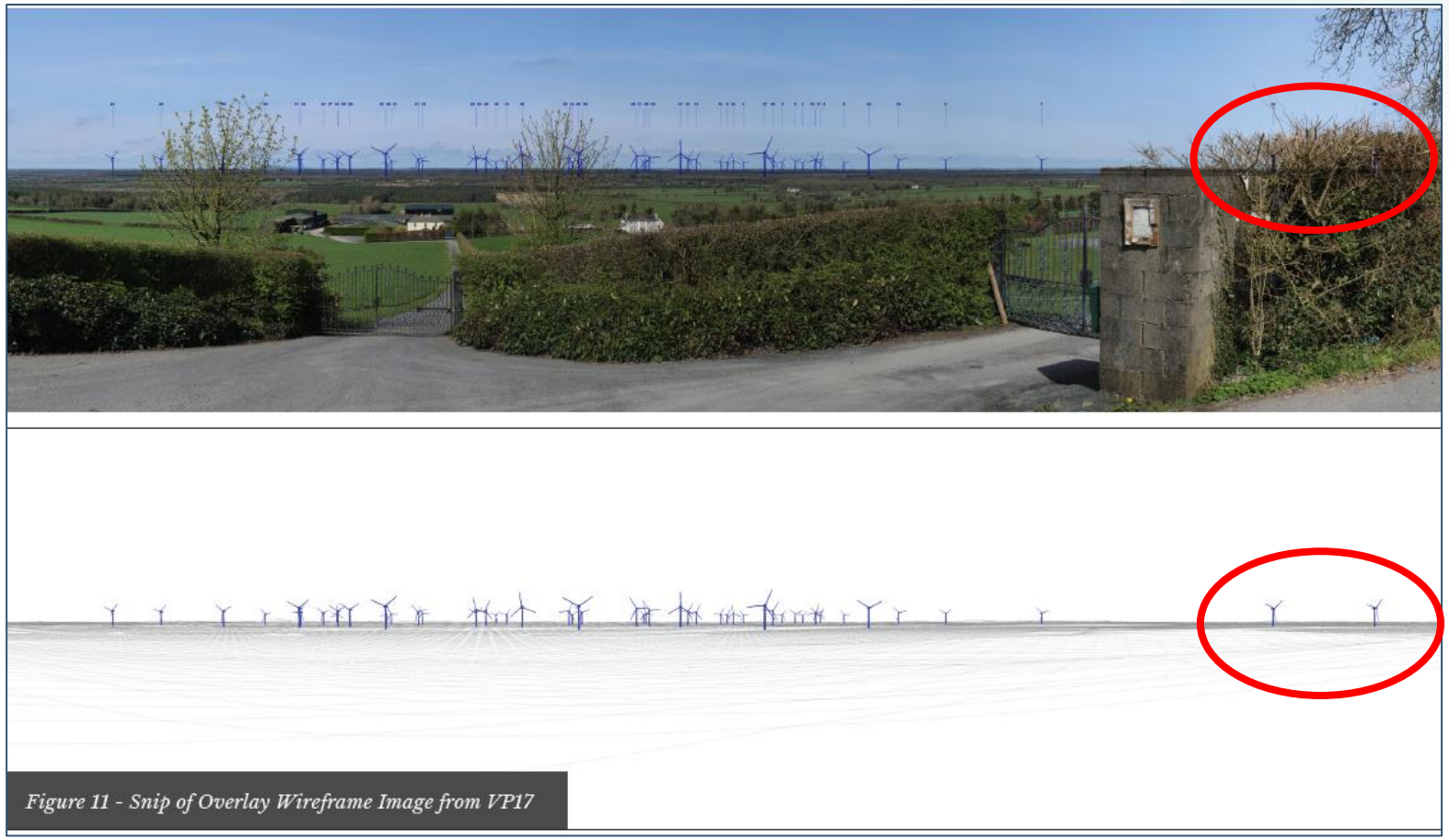


Figure 11 - Snip of Overlay Wireframe Image from VP17

Image Extracts from 2021 LVIA Study. **NOT current Turbine Layout and Design of the Proposed Project*

Implement an Appropriate Setback of Proposed Turbines from amenity at the Grand Canal (2021 - LVIA Design Analysis Study)

What: Early-stage impact assessments identified viable land for turbines nearby the Grand Canal bypassing the northern perimeter of the Proposed Wind Farm. The canal is both a landscape receptor of high sensitivity and represents visual receptors of high sensitivity using the resource in a recreational capacity.

Design Intervention:

- 4 no. turbines in the townland of Ticknevin, Co. Kildare were identified in close proximity to the Grand Canal. Therefore, an 800m buffer was applied to the Grand Canal and 3 no. turbines were micro-sited to avoid the identified buffer and 1 no. turbine was removed from the Proposed Wind Farm layout.
- Upon further review, it was identified that the 4x-tip-height set back distance (880m) typically used for residential amenity was deemed appropriate as set-back from the turbines. Therefore, a minimum setback distance of 880m from the Proposed Turbines was implemented to mitigate effects related to the Grand Canal, with T32 (the nearest Proposed Turbine) sited approximately 880m from the southern edge of the canal.

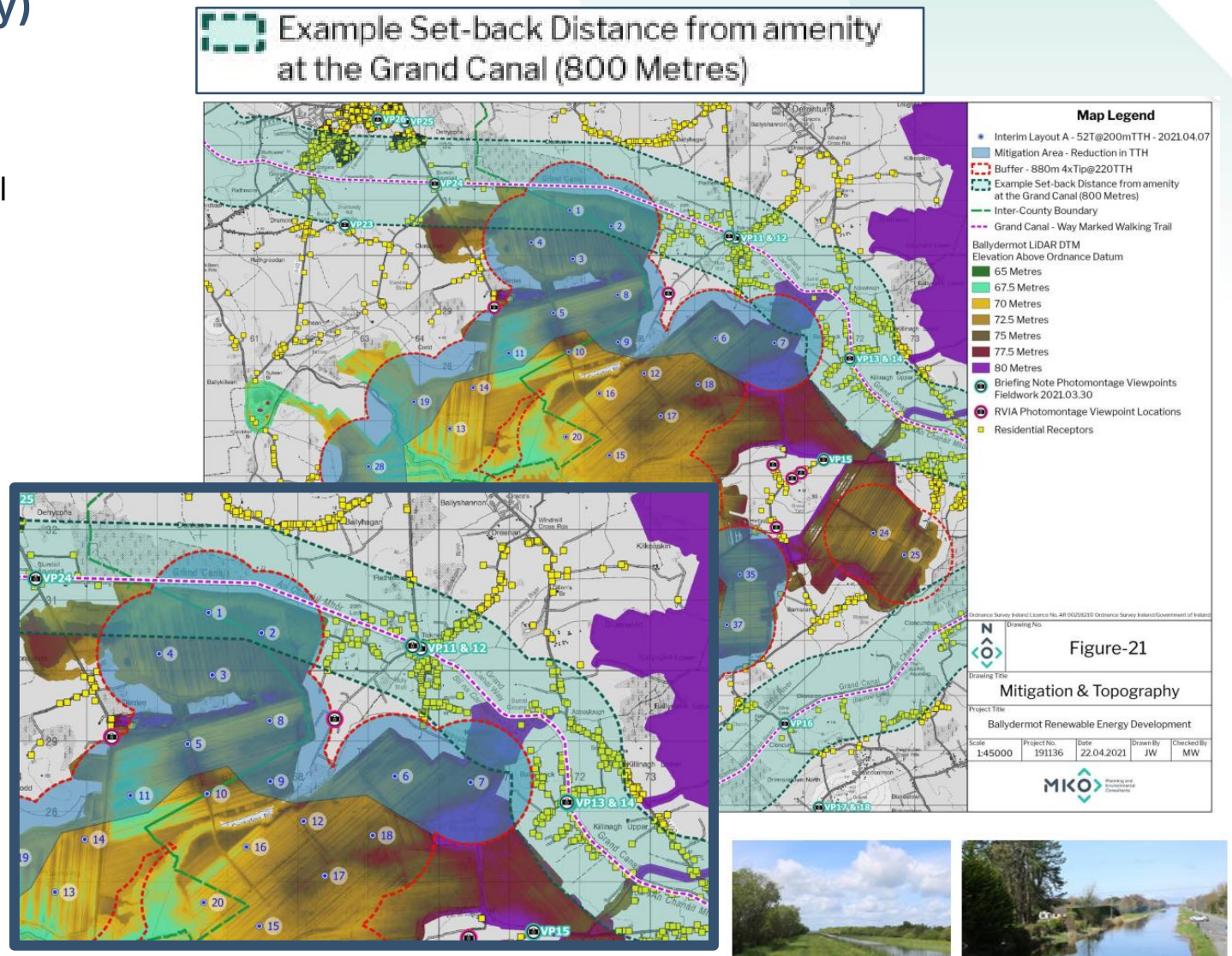


Image Extracts from 2021 LVIA Study. **NOT current Turbine Layout and Design of the Proposed Project*

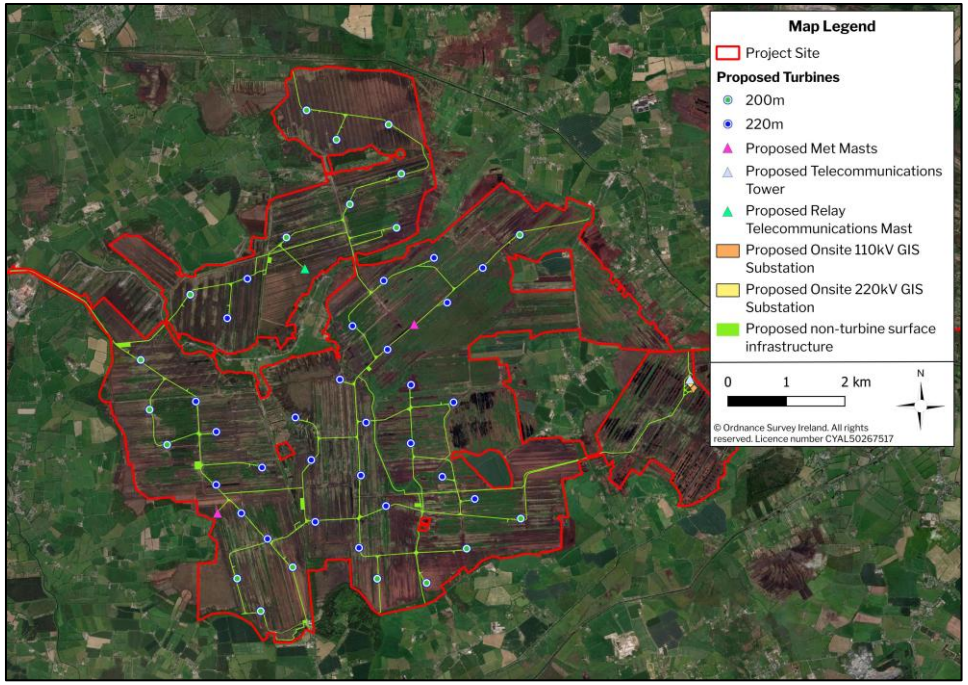
Alignment with the Design Guidance for Flat Peatland Landscape Types in the WEDG

- As set out in the WEDG 2006, Peatland landscape type has the capacity for a large-scale design and tall turbines. This is due to the

"vast visual openness with few, if any dominant geometric elements provides a certain freedom in the siting and design of wind energy developments".

- Where possible the Proposed Turbine layout is in alignment with the grid-like structure and rhythm of the cutover peatland landscape.



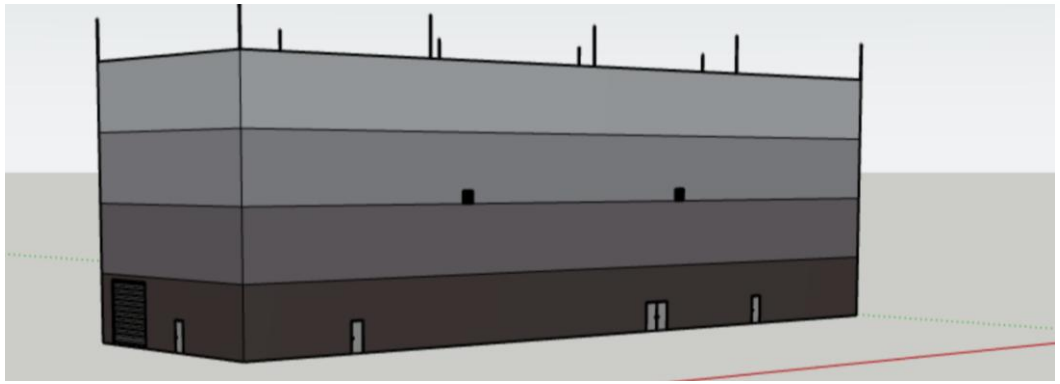


Horizontal Colour Palette for the Proposed Onsite GIS Substation

The Proposed Onsite Substation is located in Lodge Bog. The final design of the Proposed Onsite Substation underwent multiple mitigation iterations:

- **Initial mitigation approach considered:** Earth bunding combined with tree planting. While typically effective for visual screening, this approach would introduce a landscape feature entirely incongruous with the flat, open cutaway bog environment, creating an isolated woodland enclave that does not naturally exist within this landscape setting.
- **Secondary mitigation approach considered:** Lower-height native shrub and birch planting as partial screening. This more graduated approach would provide visual softening whilst respecting the open, linear landscape character. However, given the spatial constraints of the substation compound and the sensitivity of the PCAS restoration area, such planting was not feasible.
- **Final mitigation adopted:** Cladding and colour treatment of the substation buildings themselves. This approach delivers effective visual integration without introducing additional landscape features or compromising restoration objectives. The strategy comprises a graduated palette of horizontal bands with darker, muted earth tones at the base transitioning to lighter tones above, finished in non-reflective matte materials to reduce glare (subject to agreement with EirGrid, the local county council, and relevant TSO/TAO representatives). This breaks up perceived building massing and allows visual assimilation with the flat, open landscape through integration rather than physical screening.

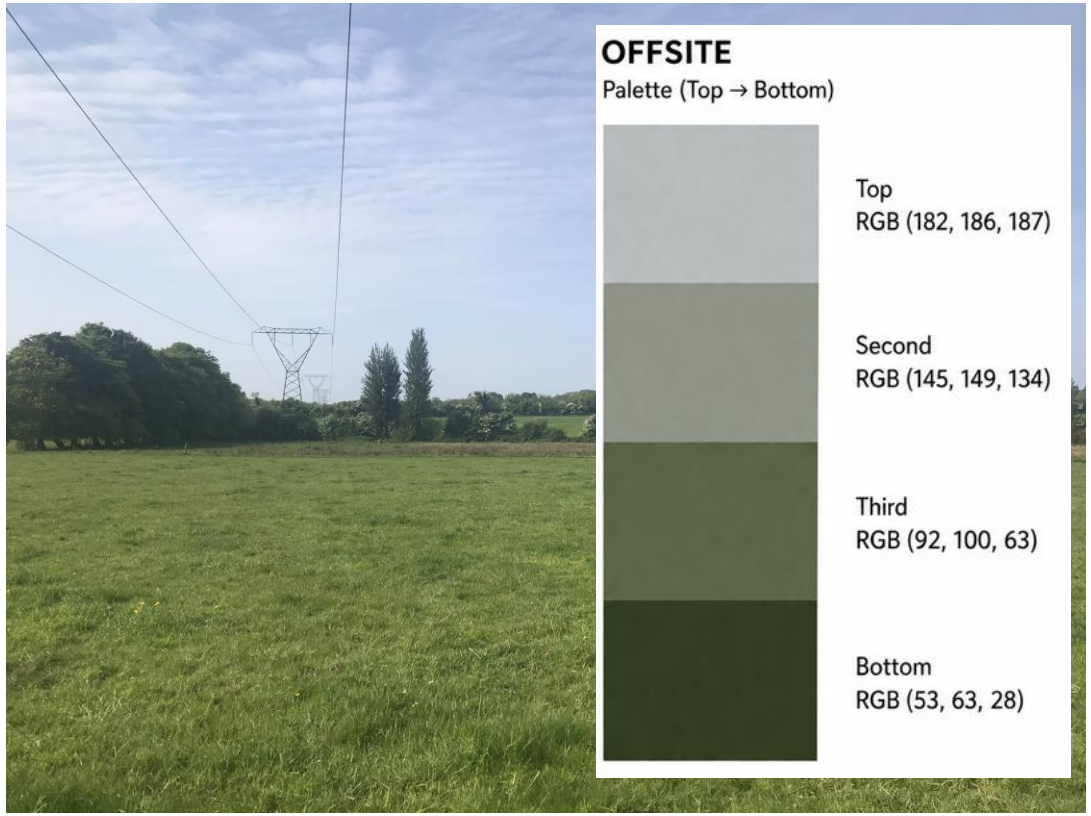


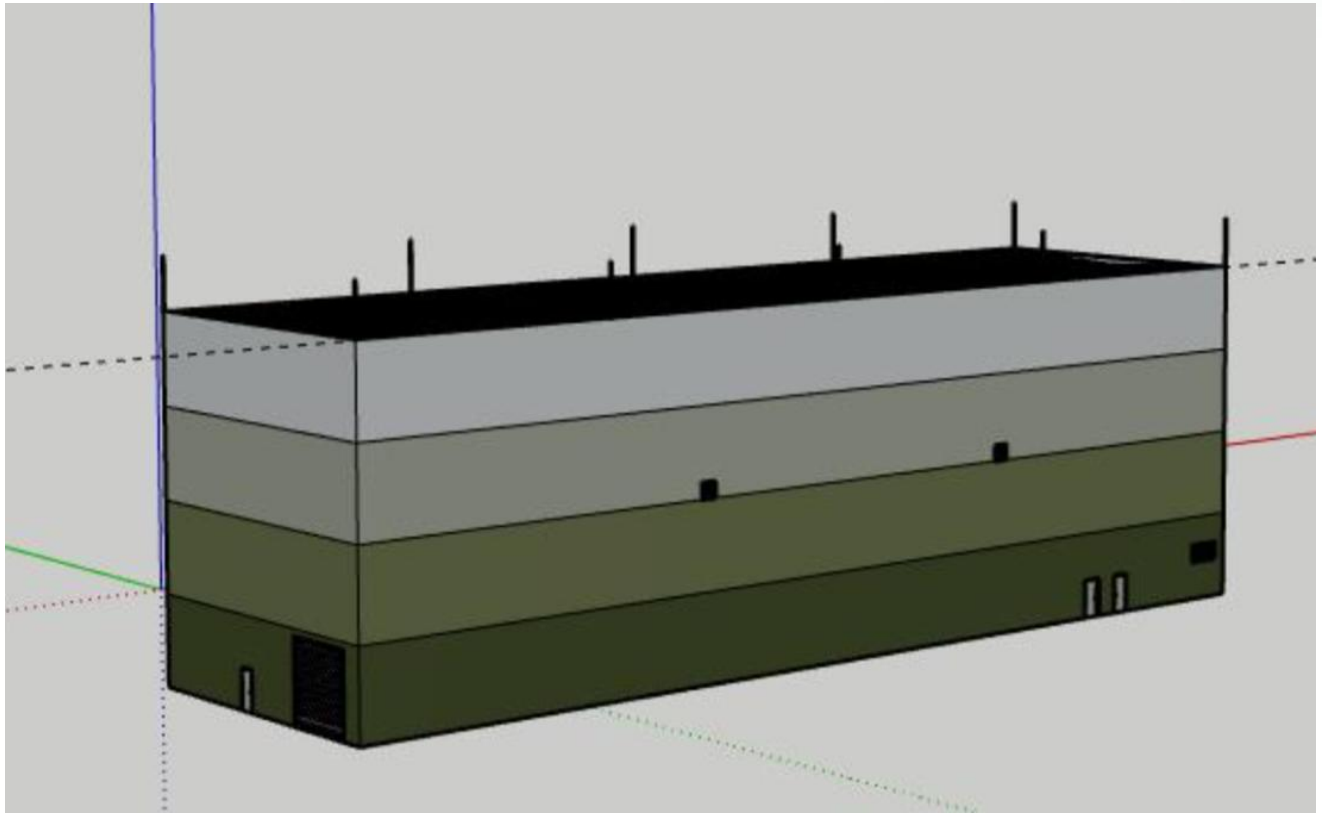




Horizontal Colour Palette for the Proposed Offsite GIS Substation

The Proposed Offsite Substation is located in an agricultural landscape. LVIA mitigation includes horizontal banding to the exterior cladding to break up the perceived massing of the building. The Offsite substation uses a colour palette graduating from dark green at the base to light grey tones above to align and assimilate with its landscape context. Existing vegetation will screen the lower components of the Proposed Offsite Substation from view.





New Safe Recreational Amenities and Access to the Landscape at Ballydermot

Proposed Project includes 13.4km of new dedicated amenity access track, complementing the 40km of proposed internal site access roads that will also be available for amenity access. Together these provide a greater variety of walking loops, improved connectivity to local roads and existing offsite amenities, and new, safe public access to the large uninhabited peatland landscape of the Proposed Wind Farm.





Proposed Enhancement Areas

Biodiversity Enhancement and Offset Measures: The Proposed Project includes specific biodiversity and ornithology enhancement, offsetting and management measures and interventions to improve the ecological and amenity value of the landscape at the Project Site; including native woodland planting, peatland enhancement, creation of pollinator friendly corridors, scrub planting and marsh fritillary habitat enhancement, these are all detailed in the Biodiversity Management Plan (BMP) (Appendix 6-5).

