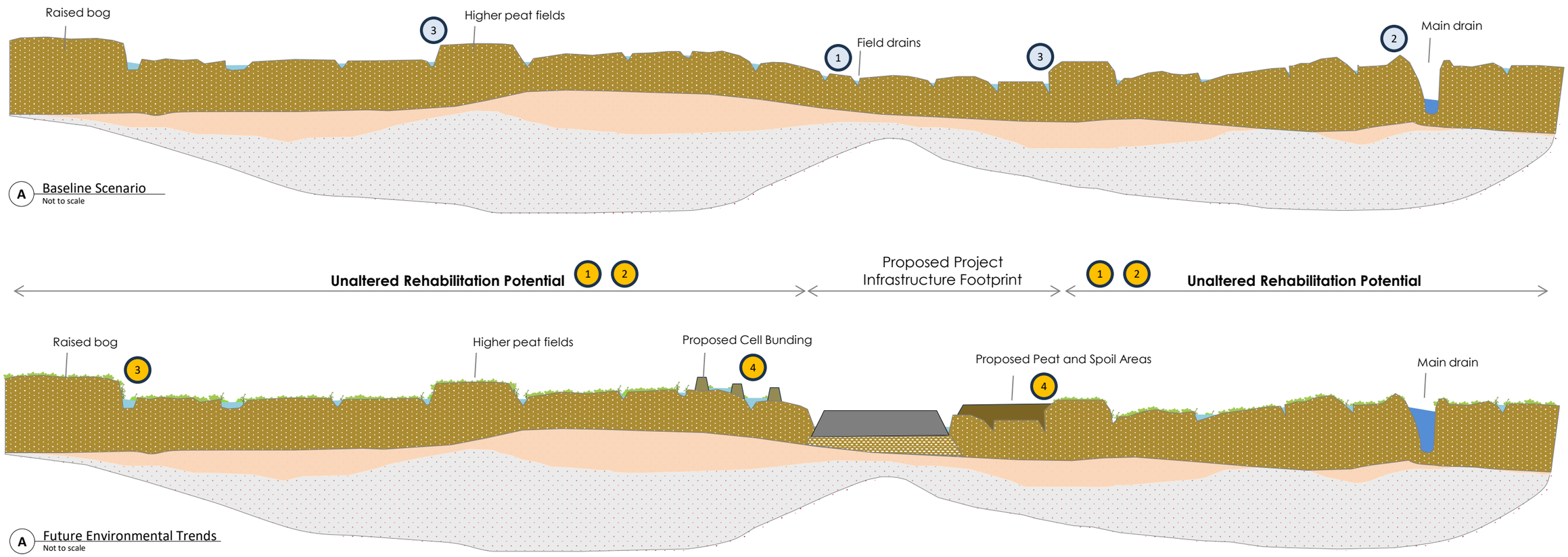
APPENDIX 9-5

OPERATIONAL PHASE DRAINAGE SCHEMATIC

CSM Scale: Please note that the vertical scale on this cross-section represents ~10m, whereas the horizontal scale represents ~1km.



CSM - Baseline Geology and Hydrology:

*This cross-section is a simplification of cutover raised bog geology/hydrology.

Peat: Large areas of residual cutover peatland, residual peat can vary in depth from 0m to ~4m across worked areas, with slightly deeper peat on margins of bogs where no peat extraction occurred, although local turbary extraction may be ongoing.

Lacustrine Deposits: The residual peat is generally underlain by varying thicknesses of low permeability Shell Marl and Lacustrine Clays. In some local areas mineral soils directly underlie peat/or are exposed at current ground level where the peat has been fully removed.

Mineral Soils/Glacial Tills: The former lake (lacustrine deposits) are generally underlain by mineral subsoils/glacial tills of varying thickness and permeability.

Bedrock: Limestone bedrock of varying composition underlies the wider area. The depth to bedrock is also variable.

1 **Drainage:** The main hydrological process across the residual cutover bog units is surface water drainage. While the deeper regional groundwater system provides underlying support, the key hydrological/hydrogeological processes in the residual peat layers are controlled by surface water drainage.

2 Within the cutover bog surface water drainage occurs via field drains, main drains, and also deeper perimeter drains, with the final water level control provided by the external streams/rivers.

The drainage gradients within the bogs are generally relatively flat.

Lower lying areas of the bogs have been drained historically by mechanical pumping. Some pumping stations are still active.

Large IPC licensed settlement ponds are already located at outfall locations from bog units. The settlement ponds are designed for the catchments they drain, and they provide attenuation storage and sedimentation retention as per the existing IPC licence (P0503-01).

3 **Topography:** The residual cutover bogs, while relatively flat, have a subtle undulating topography, while adjacent peat fields can have higher/lower elevations and there is often an occasional single peat field that sits >1m higher than the others. Peat field are ~12m wide. There is also often a rise in ground levels approaching headlands. Topography and drainage directions can also be influenced locally by underlying mineral soil ridges.

CSM - Development Drainage Proposals:

The proposed drainage system will be integrated with the existing bog drainage network and is designed to avoid significant alteration of the existing drainage regime.

Existing field drains and main drains required to accommodate the Proposed Project drainage will be maintained, with flows conveyed beneath or around access tracks using culverts where required. Field drains and main drains outside the Proposed Project drainage system may be blocked or otherwise modified as part of future peatland rehabilitation works.

Interceptor drains will collect clean upslope runoff and redirect it to downstream field drains, minimising the volume of water entering construction and developed areas.

Collector drains will capture runoff from access tracks, turbine hardstandings and other developed areas and convey it to local treatment measures.

Silt traps, check dams, vegetated buffer areas and settlement ponds will provide local sediment control and treatment prior to discharge into the existing bog drainage network.

Transverse drains (grips) will be installed along access tracks, where appropriate, to divert road runoff into adjacent swales or roadside drains.

Settlement ponds will provide additional attenuation during high rainfall, reducing peak hydraulic loading on the existing drainage network. Their design will consider greenfield runoff rates.

Treated runoff will discharge to existing peat field drains and main drains before receiving further treatment in the existing IPC settlement ponds at the bog outfalls.

The construction-phase drainage infrastructure, including collector drains and settlement ponds, will be retained and maintained during the operational phase.

Where feasible, and as part of targeted rehabilitation measures, areas adjacent to the Proposed Wind Farm site will be re-wetted to create wetland features. Any associated ponding will be shallow, intermittent and divided into smaller areas using peat berms, with no large open water bodies proposed.

CSM - Future Environmental Trends - Hydrology Discussion:

Overall, the Proposed Project infrastructure footprint is small relative to the area of the 14 bog units within the Allen Bog Group. It represents ~2.9% of the total bog area available for rehabilitation and it will not materially compromise the achievement of the rehabilitation objectives. The current aerial photograph of Cloncreen Wind Farm (https://maps.app.goo.gl/Czkze4TQfE7qK9jz7) further illustrates the localised nature of the changes associated with an operational wind farm development on a cutover bog.

The presence and operation of the Proposed Wind Farm will not materially alter the rehabilitation potential of the remaining cutover bog for the following reasons:

1
- Surface water is the dominant drainage pathway on the residual cutover bogs. A key mitigation by design is that the WF has been designed to have minimal effect on existing drainage.

2
- Drainage effects will remain localised around the Proposed Project Infrastructure Footprint, and wider drainage effects on the remaining cutover bog will be limited by:
  - Isolation by adjacent proposed peat and spoil areas, and/or natural undulations of the residual peat fields
  - Existing drainage, by intermediate field drains and main drains

3
- Significant hydrological effects on remote residual raised bog areas are not anticipated due to:
  - Distance, and elevation change
  - Existing intermediate undulations in the residual cutover topography
  - Existing intermediate field drains
  - There is often a deep drain close to the residual high bog face bank, and this drain provides further hydrological isolation
- Recent examples from completed PCAS works demonstrate that bog rehabilitation can be successfully implemented in proximity to deep perimeter drains and deep drains associated with residual rail beds. (https://www.bnmpcas.ie/gallery/completed-rehabilitation/)

4
- Mitigation – local isolation of drainage using existing topography/proposed peat and spoil areas and/or proposed cell bunding to enhance wider rehabilitation potential.

CSM Legend

- Cutover peat
- Shell marl
- Lacustrine clays (fine grey lake sediments)
- Proposed Project Infrastructure Footprint
- Post rehabilitation works vegetation regeneration
- Proposed Peat and Spoil Areas
- Proposed Cell Bunding

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Client: Bord na Móna PowerGen Ltd	
Job: Ballydermot WF, Co. Offaly/Co. Kildare	
Title: Hydrological - Conceptual Site Model*	
Figure No: 1	
Drawing No: P1511-0-1026-A3-1-00A	
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