Cutaway Bog Decommissioning and Rehabilitation Plan

Knappoge Bog

Two Year Review

October 2025

This document supports the requirements of Condition 10.2 of IPC Licence Ref. P0504-01:

> *"10.1.2 Implement the agreed cutaway bog rehabilitation plan (refer Condition 10.2). 10.2.2 The plan shall be reviewed every two years and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the written agreement of the Agency."*

This licence condition requires BnM Energy Ltd (BnM), in agreement with the EPA (Agency), to implement the rehabilitation plan as agreed, which will enable the stabilisation of this bog after the cessation of peat production and leave it free of any environmental liabilities.

Section 6 of the EPA guidance document states that the rehabilitation plan be reviewed every two years. This document outlines the review of the Knappoge Rehabilitation Plan by BnM.

Document Control Sheet	
Document Name:	Knappoge Bog - Cutaway Bog Decommissioning and Rehabilitation Plan Two Year Review
Document File Path:	Decomm and Rehab Programme Rehab and Decomm Docs38 EPA Plans - Review Docs Final for Submission Knappoge EPA 2 Year Review V3.docx
Document Status:	Final

This document comprises:	DCS	TOC	Text (Body)	References	Maps	No. of Appendices
	1	2	13	7	3	1

Rev. 0.1	Author(s):	Checked By:	Approved By:
Name(s):	SG, CS, CC, DK, MMc, PC	DK, MMc, EMD	EMD
Date:	23/09/2025	29/09/2025	30/10/2025

Rev. 1	Author(s):	Checked By:	Approved By:
Name(s):	SG, CS, CC, DK, MMc	DK, MMc, EMD	EMD
Date:	10/10/2025	14/10/2025	30/10/2025
Rev. 1.1	**Author(s):**	**Checked By:**	**Approved By:**
Name(s):	SG, CS, DK, MMc	DK, MMc, EMD	EMD
Date:	20/10/2025	20/10/2025	30/10/2025

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NON-TECHNICAL SUMMARY

- BnM has carried out a two-year review of the Knappoge Bog Decommissioning and Rehabilitation Plan.
- Knappoge Bog is located approximately 0.5km south-west of the village of Cloondara, Co. Longford, and the overall area of the bog is 314 hectares. The River Shannon forms a boundary to the west of while the Royal Canal forms a boundary along the eastern edge.
- The key objective of the proposed rehabilitation measures was to achieve best re-wetting outcomes for this site. The majority of the site not likely to be *Sphagnum*-rich and will be dominated by fen mosses.
- There were no significant changes to the scope of the rehabilitation plan as submitted and agreed by the Agency. There were minimal changes in rehabilitation type made after rehabilitation commenced due to ground conditions encountered on the ground.
- The former industrial peat extraction area was rehabilitated between August 2022 and July 2025, generally by blocking active drains with peat drain blocks and with some hydrological management. The vast majority of the planned rehabilitation has been implemented with the exception of fertiliser application which is ongoing, and the re-wetting measures have been implemented.
- Water quality monitoring indicates that suspended solids are well below the emission limit value, with ammonia and COD well below the associated trigger. Ammonia appears to be trending downwards. Results to date 2024 have been submitted to the Agency, with the 2025 results to be submitted later in 2026.
- Progress has also been reported in the Annual Environmental Report, which was submitted to the Agency on the 31st of March 2025.
- Much of the site was already establishing a range of pioneer wetland and peatland habitats prior to rehabilitation taking place at Knappoge in 2023. Pumps were decommissioned in 2018-2020. Less than a quarter of the overall site was bare peat in 2023. Rehabilitation measures have now increased the re-wetted footprint across the site. Knappoge is now a mosaic of re-wetted bare peat, wetlands, fen communities, scrub and woodland. Colonisation of pioneer vegetation is ongoing. There is some drier cutaway on shallow peat with establishing Downy Birch dominated scrub and woodland.
- Planning permission for the development of a recreational tourism greenway that is part of the Midlands Trail Network in Co. Longford, was granted and is currently under construction at Knappoge. This new greenway uses former headlands and the former industrial railway route.
- Decommissioning is ongoing. To date, 50% of waste items to include plant, equipment, materials and general waste were removed from the bog. A total of 314 hectares are confirmed cleaned with the final 314 hectares pending completion. In addition, all rail totalling 4.8km's was fully decommissioned.
- There were no significant amendments to the rehabilitation plan as submitted and agreed by the Agency. Several minor changes in rehabilitation type were made after rehabilitation commenced due to ground conditions encountered however, these changes were minimal.
- Rehabilitation at Knappoge has been successful. The condition of the site has changed radically, and the site is now colonising rapidly with a mosaic of habitats. This site is stabilising quickly and providing wetland habitats of high biodiversity value. This site is also rapidly developing amenity interest as well.

1. INTRODUCTION

BnM operates under an Integrated Pollution Control Licence (IPC) issued and administered by the Environmental Protection Agency (the Agency) (Ref. P0504-01). As part of Condition 10.2 of this licence, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licenced area. Knappoge bog is part of the Mount Dillon bog group. Knappoge Bog is located in Co. Longford. Knappoge Bog is also referred to as 'Knappogue' and the use of this designation, such as in mapping, should be seen as interchangeable with 'Knappoge'.

This rehabilitation was finalised by BnM in 2022 and approved by the Agency on the 26/07/2022. This rehabilitation plan can be viewed at Knappoge-Rehab-Plan_v7.pdf.

The development of the rehabilitation plan for this bog considered published guidance issued by the EPA in 2020 – Guidance on the process of preparing and implementing a bog rehabilitation plan. 05467-EPA-Bog-Rehabilitation-Report-Web-Proof-03.pdf.

Section 6 of this EPA guidance document states that the rehabilitation plan must be reviewed every two years.

This document outlines the two-year review of the Knappoge Rehabilitation Plan by BnM.

This document should be read in conjunction with the Knappoge Bog Cutaway Bog Decommissioning and Rehabilitation Plan available on the BnM Peatlands Climate Action Scheme website at the following location https://www.bnmpcas.ie/bogs-peatlands-climate-action-scheme/.

The Annual Monitoring Reports for the Peatlands Climate Action Scheme also outlines progress of the PCAS programme at Knappoge. The Annual Monitoring Report can be viewed at Supporting Material - BNM Peatlands Climate Action Scheme (bnmpcas.ie). The Annual Environmental Reports submitted each year to the EPA can be viewed at www.epa.ie.

2. BASELINE ENVIRONMENT

The original baseline environment was outlined in the Knappoge Bog Rehabilitation Plan. Wetlands, open water and scrub habitats were developing across the majority of areas across Knappoge. A small proportion of Knappoge was dry bare peat at the beginning of rehabilitation in 2022, mainly headlands and a section within the northern lobe, the northern section of the western half and south of the rail line which separates the east and western sections. The majority of the former peat production footprint is a mosaic of open water, wetland habitat, scrub or pioneering bare peat. Water levels in the wetlands are impacted by water levels of the adjacent River Shannon, with high water levels generally when the River Shannon is in flood during the winter. Pioneer open habitats have developed in more elevated drier parts of the site along with the scrub communities.

Rehabilitation has been carried out at Knappoge Bog in phases. Previous rehabilitation during 2015-2021 included the decommissioning of pumps and the adjustment of outfalls. These measures led to the creation of several large wetlands. This phase of rehabilitation in 2023 targeted widespread drain blocking across the cutaway. These changes are outlined in future sections of this report.

Extensive areas of Knappoge already have well established pioneer vegetation including Reedbeds, fen and Birch woodland/scrub. These habitats will continue to develop post rehabilitation as the implemented measures have consolidated wetland conditions across the majority of the site.

A network of walking and cycling trails on BnM lands is currently under construction through Knappoge along the decommissioned BnM industrial railway and will not impact on the completed rehabilitation measures. This will connect with the existing Mid-Shannon Wilderness Greenway which bisects the northern portion of the eastern section along a local road and continues south along the BnM railway line. When complete this will link Derryarogue Bog to the west through Knappoge to the Royal Canal and Begnagh Bog to the east.

The baseline is as submitted in rehab plan and there have been no other significant changes to the baseline environment at Knappoge Bog.

3. CONSULTATION

3.1 Consultation with interested parties.

As required under the EPA's guidance document and as part of the two-year rehabilitation plan review BnM sought consultation and feedback from stakeholders of the relevant bogs. As part of this process a questionnaire was sent to interested parties who were consulted on the draft rehabilitation plan in 2021 or who expressed an interest subsequent to the commencement of the rehabilitation.

An email was sent to all relevant stakeholders on July 1st, 2025, asking that they provide feedback via a questionnaire link. Where an email address was not available, a text message was sent, and a hard copy of the questionnaire was issued by post on request. The closing date for responses was July 29th, 2025.

The stakeholders contacted included local landowners/householders who had engaged in the initial public consultation process along with other interested organisations and groups at national and local levels.

Questionnaire.

A total of 402 stakeholders were contacted and invited to complete the questionnaire, for all bogs in that year of the scheme.

The stakeholders contacted were both local and national in nature, including relevant government departments and agencies, relevant semi-state bodies, NGOs, representative groups, farming organisations, research bodies and other environmentally focused groups with a national remit. Most if not all of these organisations would also have been invited to make submissions when the Rehabilitation Plans were first drafted. Local community groups and private individuals or landowners who contacted us previously during the original consultation or since were also invited to participate.

Summary of responses received.

Respondents were invited to provide feedback on the perceived importance of various elements of the Scheme, including how rewetting former industrial peat extraction sites could support natural vegetation recovery, improve water quality, reduce carbon emissions, enhance biodiversity and ecosystem services, and protect on-site archaeological features. While many responses were general in nature, BnM has addressed any specific issues raised.

Submissions also allowed respondents the opportunity to provide feedback/comments on various aspects of the scheme while also providing them with a forum to highlight any issues. In analysing the responses to the questionnaire, the feedback/issues were grouped into four categories. Those categories and a summary of responses are outlined below.

Table 1. Feedback Categories

Total Number of Questionnaires Issued	402
Total number of Questionnaires Returned	24
Response Category	**No. of Responses per category contained within the returned questionnaires**
Community Engagement/Communication	24
Rehab Plan Design/Objectives	24
Biodiversity/Environment/Conservation	24
Other	19
Total no of topics commented on?	91

Respondents expressed a strong appreciation for the ongoing efforts by BnM to restore and protect Ireland's boglands, recognising the importance of these landscapes for biodiversity, climate action, and local communities. There is clear enthusiasm for the potential of well-planned rehabilitation to enhance both environmental and social value across the regions.

A consistent theme throughout the feedback is the desire for improved communication and collaboration. Many respondents highlighted the importance of ensuring that all local landowners and community members are kept fully informed and have opportunities to engage with the rehabilitation process. Enhanced consultation, transparency, and responsiveness from BnM and local authorities were identified as key to building trust and achieving shared goals.

Several respondents encouraged the integration of rewetting, wetland creation, and species conservation within a broader, landscape-scale approach. These respondents support initiatives that promote biodiversity, including the return of waders, ducks, and ground-nesting birds such as curlew, and that prioritise ecological restoration over industrial or energy developments.

Some contributors see great potential in developing eco-tourism and amenity opportunities linked to peatland restoration. Providing public access, walking trails, and educational signage would help raise awareness of the ecological and climate importance of bogs while benefiting local economies and well-being.

Feedback from some respondents also emphasises the importance of community partnerships and local stewardship, with a call for communities to be recognised as key stakeholders in the Just Transition. Respondents stressed that the process should deliver lasting benefits for both nature and people, through regenerative tourism, community engagement, and respect for local knowledge.

Practical suggestions were also offered, such as producing clearer maps and site overviews, improving responses to submissions, and addressing site-specific issues like water management near forestry areas.

Overall, the feedback reflects a deep commitment to conservation, collaboration, and accountability. There is clear public support for BnM's transition toward restoration, provided that it remains transparent, inclusive, and guided by long-term ecological and community values.

BnM response to observations/issues raised during review process.

Community Engagement/Communication

BnM endeavour to engage with all stakeholders including landowners and interested parties through a variety of means, including the issue of emails and rehab plans to NGOs, Councillors, community groups, farming bodies, Government Bodies etc., the provision of a website with a map of the bogs to be rehabilitated in 2022 and copies of the draft rehabilitation plans. BnM have also used a combination of newspaper notices, media interviews, virtual calls, and presentations where necessary, at different times during consultation.

Submissions are invited from all interested parties before the Rehabilitation Plans are finalised. A Community Liaison Officer (CLO) was also appointed at the outset of the scheme, who was available to take calls to discuss specific bogs, contact details are available on the website.

Stakeholders were invited to make submissions in advance of rehabilitation taking place on the Year 2 bogs, as part of this consultation an email advising of BnM's intention to rehabilitate each bog along with a link to the Draft Rehabilitation Plan was sent to a list of stakeholders. The stakeholders included local authorities, farming organisations, community groups, environmental groups, Non-Governmental Organisations (NGOs), relevant

Government Departments, relevant semi-state organisations and regulatory/statutory bodies along with local and national elected representatives. Submissions were invited from all stakeholders, and a consultation period (typically three weeks) was provided for.

In addition to this email, households within a 1 km radius of the bog boundary received a letter advising of the intended rehabilitation and providing contact details for any queries. This letter was accompanied by an information leaflet, and these documents were hand delivered by the dedicated EDRRS Community Liaison Officer (CLO) with the assistance of other BnM representatives as needed. The CLO and BnM engaged with householders where queries or concerns were raised when delivering these documents.

The consultation period for the EDRRS Year 2 bogs commenced in October 2022 and ran until May 2022.

A full list of the Year 2 bogs is available on the website along with Rehabilitation Plans and associated map books for each site, these documents are available at: https://www.bnmpcas.ie/2022bogsrehabilitation/.

Full details of all other current PCAS bogs are on the website.

Rehabilitation Plan Design/Objectives

The measures included in the Rehabilitation Plan design were planned by a team consisting of expert ecologists, hydrologists, and engineers. Each Rehabilitation Plan is reviewed and subject to approval by both the National Parks and Wildlife Service (NPWS) and the Environmental Protection Agency (EPA). It is a guiding principle of BnM rehabilitation planning that no actions or activities will be undertaken that would negatively impact on adjacent land. No boundary drains will be blocked. Water will still leave the bog via the existing outlets.

Various methodologies are employed depending on conditions on each site though primarily these would include the creation of cells and carrying out drain blocking with the aim of retaining water on each bog.

The objective of the rehabilitation is to ensure environmental stabilisation of the former peat production areas and set each bog on a trajectory towards peat forming conditions. There is an ongoing programme to monitor, verify and report on the changes observed following rehabilitation including hydrology, biodiversity, and carbon fluxes.

Further details on monitoring carried out as part of PCAS is available on the website at https://www.bnmpcas.ie/supporting-material/.

Drainage/Flooding

A Hydrological risk assessment was undertaken for all PCAS bogs which among other things, assesses the potential impact of the various rehabilitation measures which are proposed on the local drainage network and the potential risk of causing additional flooding of adjoining lands or roads. Where any such additional flooding risks are identified, the proposed rehabilitation measures are adjusted to minimise any such additional risks and such adjusted measures are identified in the hydrological assessment.

The rewetting of bogs in this scheme involves the blocking of the former peat production drains and this in turn will return the bogs to a more natural water retention function. As a result of this rehabilitation, it is expected that peak flows will reduce during intense rainfall events. All boundary drains and outfalls will continue to operate and will not be affected by the rehabilitation measures.

BnM will continue to manage their land bank into the future. As industrial peat production has now ceased on BnM lands and rehabilitation measures will be carried out, a regular drainage maintenance programme will not be required or carried out as would have been the case in the past. However, if issues arise with the BnM internal drainage system that affects upstream or downstream landowners, then these issues will be addressed by BnM through its care and maintenance programme.

Where specific concerns have been raised regarding impacts on adjoining lands BnM have engaged with individuals as needed.

Our Community Liaison Officer has been available to meet with landowners since the commencement of the scheme and, where required, the wider team including the Design Engineers have also been available where specific queries required their input. To date the majority of queries have been resolved to the satisfaction of both parties with a number of queries still ongoing.

Monitoring/Results

As part of PCAS, a monitoring and verification plan has been developed to support climate action and biodiversity objectives. Monitoring currently being carried out includes biodiversity, carbon, hydrology (water levels) surface water and flow monitoring.

Biodiversity monitoring includes stratified monitoring of bog condition, habitats, and biodiversity at several different scales. It is proposed to monitor the improvement of some biodiversity ecosystem services. The appearance of key species such as *Sphagnum* moss will be monitored during walk-over questionnaires and general monitoring visits. Biodiversity monitoring for PCAS planned for a stratified approach with different targeted monitoring at different sites based on the site characteristics.

Significant time and resources have been inputted into the monitoring of the Year 2 bogs and the data collected will be utilised to verify the benefits of the scheme. While these benefits and their verification will take time to determine, the data collected on an annual basis can be used to assess the trajectory of each bog in terms of hydrogeology, carbon emissions, biodiversity benefits and surface water quality. Further data over the lifetime of the scheme will continue to provide information in this regard, in particular as the availability of sites with both climate action measures and other effective conservation measures becomes more important at a National and International level.

Further details on monitoring carried out as part of PCAS is available on the website at https://www.bnmpcas.ie/supporting-material/.

BnM Land-use strategy

BnM have now transitioned to a renewable energy company. We utilised these bogs in the past to extract peat for energy and other uses. Now, BnM's vision is to develop renewable energy across its landbank to support Irelands energy supply and targets for renewable energy in the National Climate Action Plan. This strategy means that infrastructure will be integrated with the cutaway landscape. Previous renewable energy projects have demonstrated that only a small portion of land is required for renewable energy infrastructure (< 5%). This means there is still plenty for space for biodiversity. Re-wetting can be carried out between this infrastructure and Cloncreen Windfarm and Mountlucas Windfarm are great examples of this integrated land-uses strategy. Ultimately this strategy looks to optimise multiple benefits from this cutaway landscape by developing renewable energy, by providing amenity across these sites for local communities and other visitors and by re-wetting residual peat and providing new habitats for biodiversity. BnM are still committed to the rehabilitation of these cutaway bogs and this will be delivered by this strategy.

3.5 Knappoge Bog

No comments or feedback was received specific to Knappoge Bog.

BnM responded to each consultee, acknowledging their feedback and advising of the location where final reviews will be available to view, via the following link: BNM Peatlands Climate Action Scheme (bnmpcas.ie).

4. REHABILITATION GOALS AND OUTCOMES

No change from what was submitted and agreed upon by the Agency.

5. SCOPE OF REHABILITATION

No change from what was submitted and agreed upon by the Agency.

6. REVIEW OF REHABILITATION ACTIONS

https://www.bnmpcas.ie/2022bogsrehabilitation/

6.1 Short-term planning actions (0-1 years)

- Develop a detailed site plan with detailed site drawings outlining how the various rehabilitation methodologies (within the proposed PCAS) will be applied to Knappoge Bog. This will take account of peat depths, topography, drainage and hydrological modelling. A detailed site plan with site drawings outlining the planned rehabilitation was developed and incorporated into the Rehabilitation Plan. See the accompanying Map Book.
- Carry out a hydrology and drainage management assessment of the proposed enhanced rehabilitation measures. A hydrology and drainage assessment of the proposed enhanced rehabilitation measures was carried out and the conclusions incorporated into the final rehabilitation plan.
- A review of issues that may constrain rehabilitation such as known rights of way, archaeology, turbary, and existing land agreements was carried out and incorporated in the rehabilitation plan, where required. A review of issues that could constrain rehabilitation was carried out. Rehabilitation was planned as to integrate proposed amenity through Knappoge, in particular the Mid-Shannon Wilderness Park Greenway which will link into the Midlands Trail Network in Co. Longford. Permission for this amenity was granted (07/01/2025) and this has been partially constructed. These amenity routes use the old industrial rail routes and headlands and will not impact on the completed rehabilitation measures. Some marginal land was constrained from rehabilitation in the marginal cutover bog zone to the north, southeast, north and southwest of the western section due to private turbary identified. Rehabilitation in these areas was constrained to avoid any impacts to turf-cutters this area. Several Rights of Way exist at Knappoge which intersect the travel pass to Begnagh Bog. Some land was constrained from rehabilitation due to grazing along marginal lands to the southeast corner, north and south of the western section. The Shannon Callows and woodland along the River Shannon was also constrained from the rehabilitation measures.
- A review of remaining milled peat stocks was carried out. All peat stocks have been removed. No peat stocks remained on Knappoge Bog.
- Ensure all activities comply with the environmental protection requirements of the IPC Licence. All activities were regulated and governed under the applicable IPC Licence and associated 14 conditions. There were no exceedances in water quality emission limit values and limited trigger level exceedances in COD noted during the period of the rehabilitation or reported to the Agency.
- Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures (AA) and other environmental control measures during the implantation of the rehabilitation plan. Ongoing - This was managed through a system of engagement, communication and training with operatives on the ground to ensure all mitigation measures, constraints and restrictions were managed.

6.2 Short-term Practical Actions (0-2 years)

- Carry out proposed measures as per the detailed site plan. This will include a combination of pump management, drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas. All rehabilitation will be carried out with regard to environmental control measures. Drain-blocking, peat field re-profiling and fertiliser application completed. Rehab

berms and the piping of drains were included as part of the measures, See Section 7.2. Two pumps had been previously decommissioned.

- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions. Ongoing, See Section 7.
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent silt run-off from the site during the rehabilitation phase. Silt ponds have been maintained as required under the licence during this period. Based on water quality results submitted to the Agency in August 2023 indicating ongoing improvements in suspended solids in the surface water, and subsequent monitoring results in May 2025, the Agency have agreed to approve a request to base the annual silt pond cleaning schedule on water quality monitoring results and inspections.

6.3 Long-term (>3 years)

- Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary. This evaluation is Ongoing and will be made available when annual monitoring reports for the overall scheme, including Knappoge Bog, will be made available on the PCAS website.
- Potential for decommissioning of silt-ponds will be assessed and carried out, where required. Silt pond maintenance requirements are water quality results based. Silt ponds in the bogs will not only be required to be maintained if water quality monitoring of suspended solids indicate that the pond system is starting to retain silt.
- Reporting to the EPA will continue until the IPC Licence is surrendered, or the boundary amended.

6.4 Budget and Costing

No change.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

This section outlines what criteria were used to indicate successful rehabilitation and what critical success factors were needed to achieve successful rehabilitation. All criteria used to indicate successful rehabilitation were measured to validate the achievement of the rehabilitation goals and outcomes and validate the completion of the rehabilitation.

The key objective of this rehabilitation plan is **environmental stabilisation** and the stabilisation of any emissions from the site that related to the former industrial peat extraction activities.

Rehabilitation is generally defined by BnM as

- stabilisation of bare peat areas via targeted active management (e.g. drain-blocking/re-wetting) slowing movement of water across the site and encouraging natural colonisation; and
- mitigation of key emissions (e.g. potential suspended solids run-off).

7.1. Criteria for successful rehabilitation to meet EPA IPC licence conditions:

Table 7.1.1. Summary of Success criteria, targets, how various success criteria will be measured and expected timeframes.

Criteria type	Criteria	Target	Measured by	Expected Timeframe	Status
IPC validation	Rewetting in the former area of industrial peat production	Delivery of planned rehabilitation measures. This will be a combination of drain blocking and bunding	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking)	2021-2025	Completed See Section 7.2
IPC validation	Key water quality parameters Ammonia, Phosphorous, Suspended solids, pH and conductivity	Reduction or stabilization of key water quality parameters	Monthly Water quality monitoring. Started in advance of the proposed rehabilitation.	2021-2023	Ongoing See Section 7.3
IPC validation	Reducing pressure from peat production on the local water body	Where the section of the water body, that this bog drains to, has been identified as under pressure	EPA WFD monitoring programme Additional BnM water quality monitoring	WFD schedule	N/A

Criteria type	Criteria	Target	Measured by	Expected Timeframe	Status
	catchment (WFD)	from peat extraction, that the intervening EPA monitoring programme associated with its Programme of Measures for this water body, confirms that there is an improving trajectory in water quality from the peat extraction associated with activities at this bog.			
Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action.	Optimal extent of suitable hydrological conditions	Aerial photography and Habitat mapping to map extent of suitable hydrological conditions.	2021-2025	Completed See Section 7.2, 7.3
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a high bog condition assessment and appropriate carbon emission factors.	2021-2025	Ongoing Section 7.5
Climate action verification	Setting the site on a trajectory towards establishment of a mosaic of compatible habitats	Establishment of compatible cutaway habitats	Habitat map, Cutaway bog condition map.	2021-2025	Ongoing Section 7.5
Climate action verification	Biodiversity and ecosystem services.	Improvement in biodiversity and ecosystem services.	Metrics that relate to selected biodiversity and ecosystem services	2021-2025	Ongoing See

Criteria type	Criteria	Target	Measured by	Expected Timeframe	Status
	Habitat establishment Presence of key species – Sphagnum Breeding birds Pollinators		Presence of key species – Sphagnum – Walkover survey Breeding birds – Breeding bird survey Pollinators – Pollinator walk		Section 7.5

7.2. Delivery of Measures:

The rehabilitation measures were substantially completed in Knappoge Bog at the end of July 2023. The following figures show some typical images of the rehabilitation measures carried out in Knappoge Bog.

Figure 7.2.1. Knappoge Bog rehabilitation measures – December 2022.

Figure 7.2.2. Knappoge Bog rehabilitation measures – December 2024.

7.3. Water quality:

Water quality monitoring commenced in August 2020 and is scheduled to cease 2 years after the completion of rehabilitation at this bog. This monitoring programme may be extended and frequency amended if trends need to be tracked beyond the 2 years. As required under the rehabilitation plan approval conditions, annual water quality monitoring results were submitted to the Agency in August 2023 for the period up to December 2022, with the 2023 results submitted in 2024. These indicated the trends highlighted below, with the majority of relevant parameters indicating no increase in concentration and some showing an improving downward trend. Suspended solids are averaging under 5mg/l from the two emission points measured, with pH showing a slight increasing trend, but would be expected over the longer term to become more acidic as the rehabilitation expands and extends. Apart from initial peaks in Ammonia above the trigger levels in mid-2022, levels seem to have stabilised a lot lower with COD also dropping, despite trending observed in other bogs to the contrary.

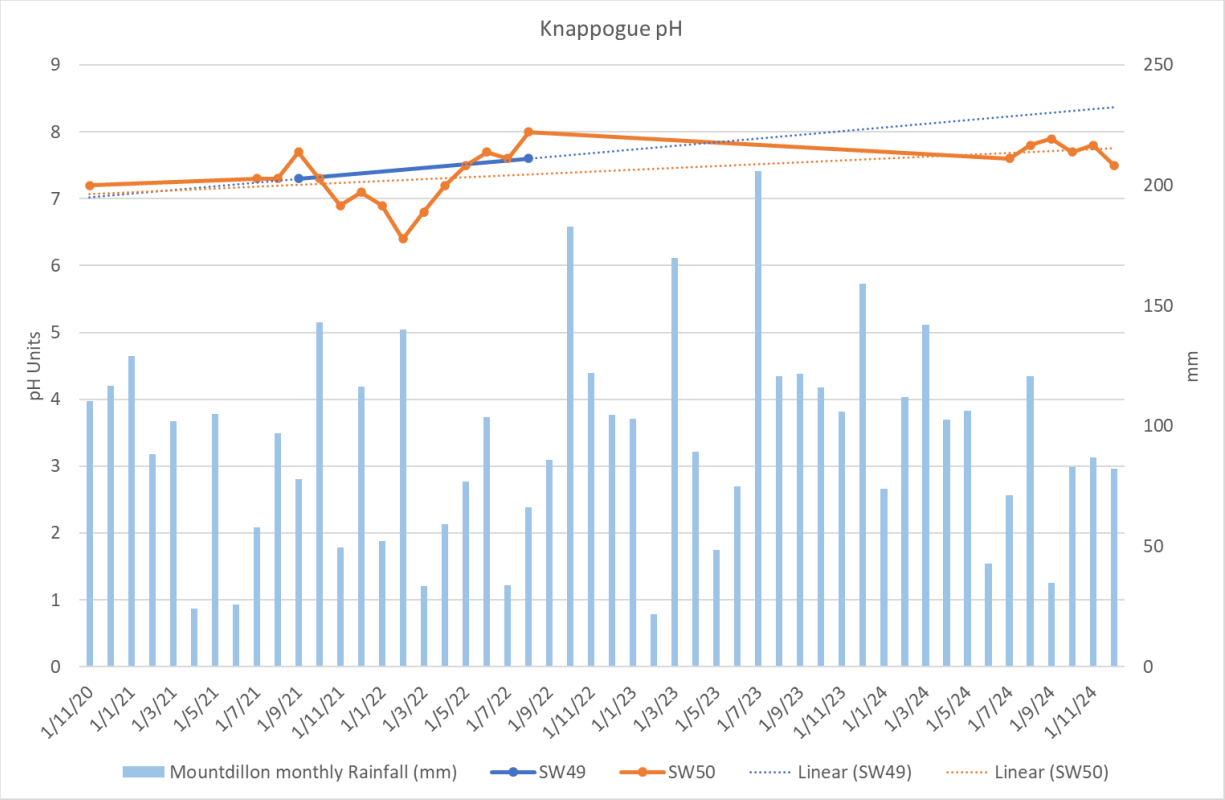

Figure 7.3.1. Knappoge pH monitoring results.

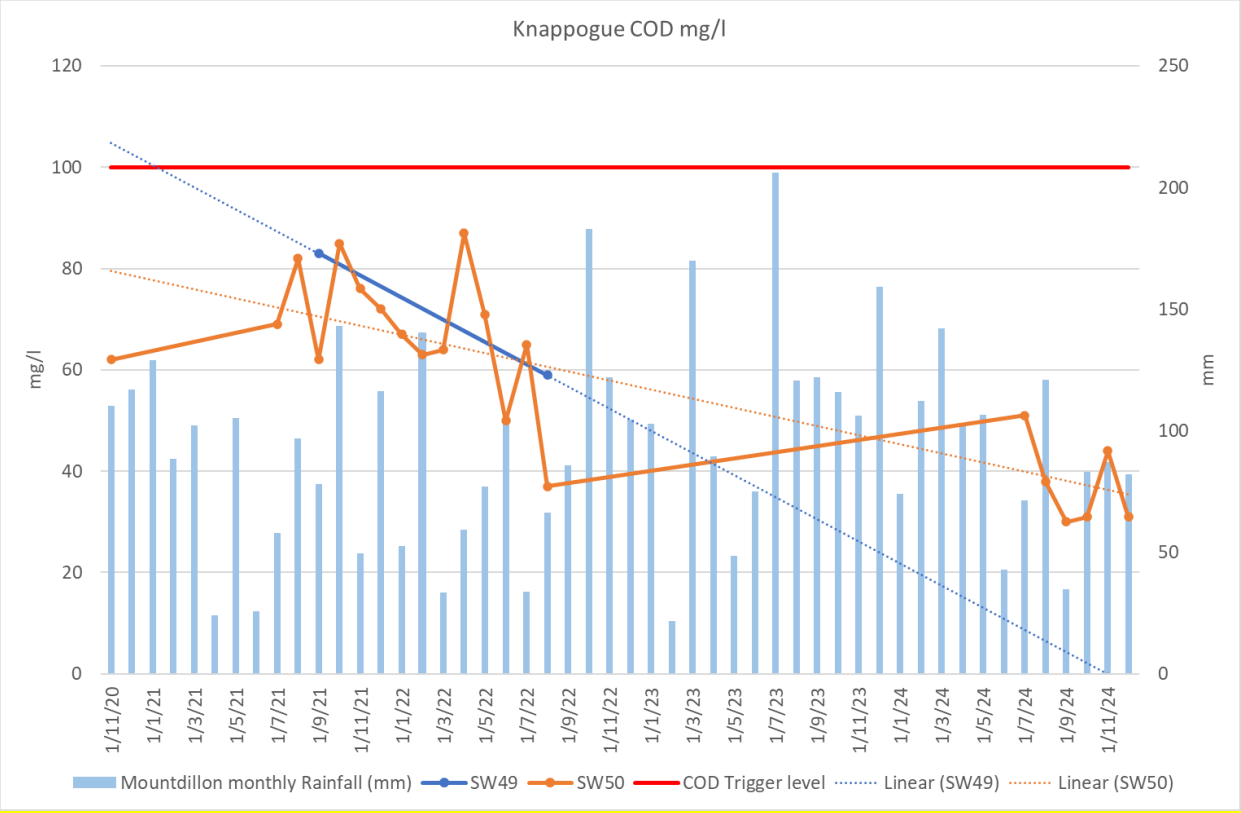

Figure 7.3.1. Knappoge COD monitoring results.

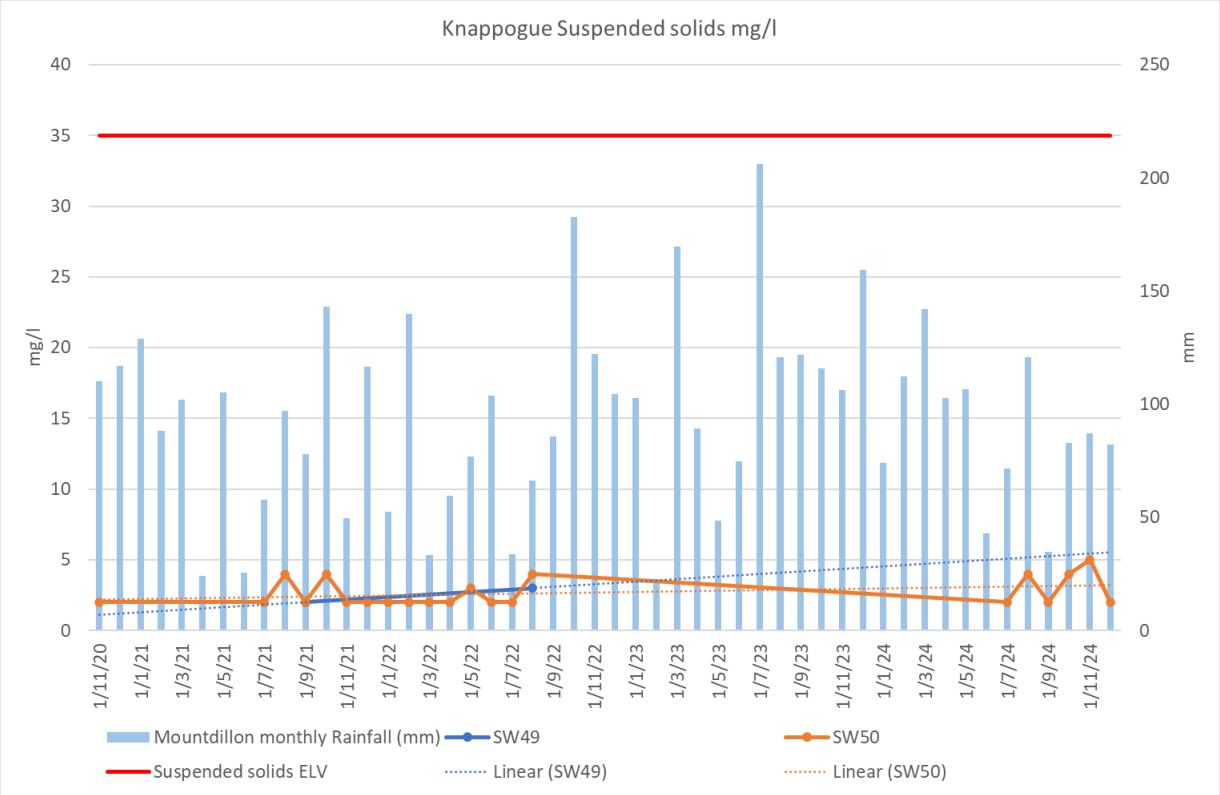

Figure 7.3.1. Knappoge Suspended Solids monitoring results.

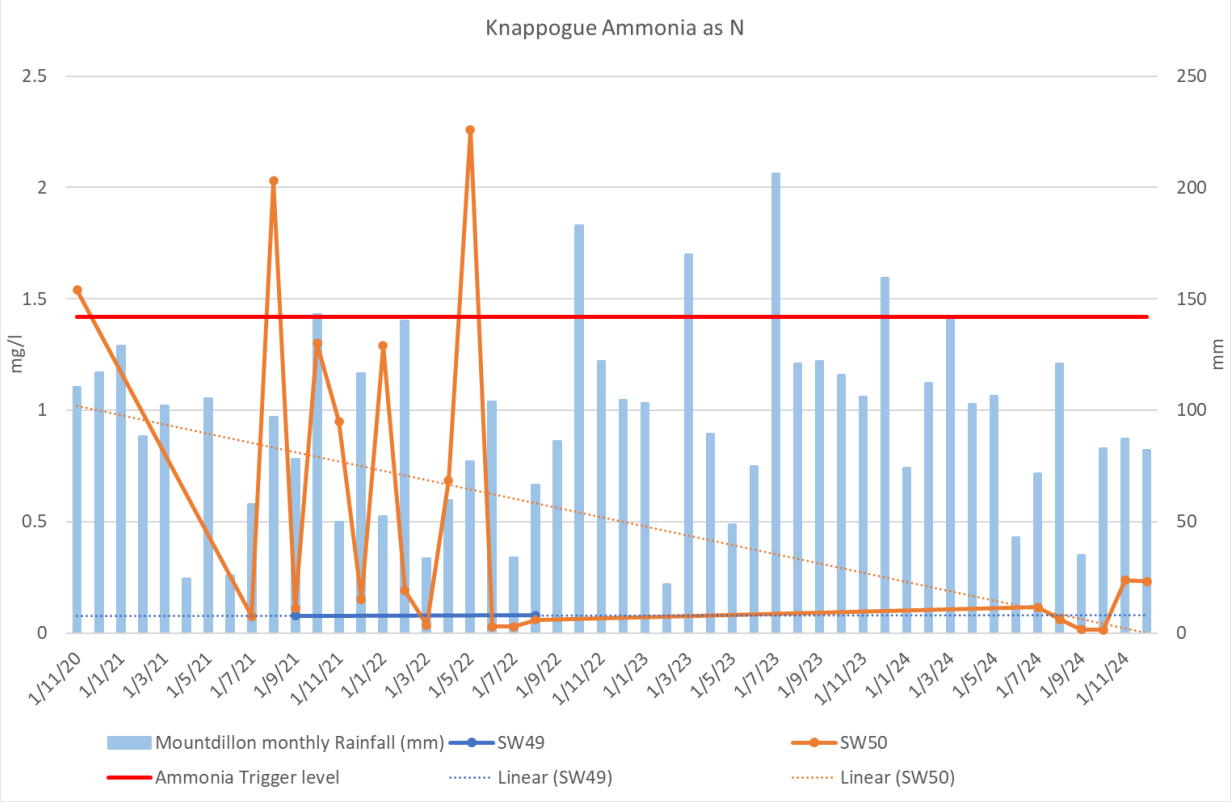

Figure 7.3.1. Knappoge Ammonia monitoring results.

7.4. Hydrology:

Hydrological conditions are one of the most important drivers of ecological functioning of peatlands. A core objective of the Enhanced Decommissioning, Rehabilitation and Restoration Scheme is to improve hydrological conditions in cutaway and drained peatlands to reduce carbon emissions by re-wetting residual peat, and where feasible establish conditions suitable for the development of peat-forming vegetation types and/or the trajectory towards naturally functioning peatland habitats.

A network of monitoring wells (measuring water table levels) and piezometers (measuring hydraulic head at the base of the peat) have been installed across each of the bogs rehabilitated under the scheme. A subset of the locations has also been instrumented with automated data loggers, recording groundwater levels at hourly intervals. These loggers will provide the most suitable long-term datasets that will allow for interpretation of results and incorporation of learnings into the scheme as it progresses.

Hydrological monitoring rationale

Hydrological monitoring locations were selected to meet a range of criteria, including:

a) Collect baseline data on the hydrological setting of each site to inform rehabilitation design and establish appropriate target rehabilitation measures (through improved characterisation of hydrological conditions).

b) Collect data prior to, during and post-rehabilitation to assist in determining the impact of specific rehabilitation measures on groundwater levels and flow direction within the bog (to inform future rehabilitation measure design).

c) Collect data prior to, during and post-rehabilitation that can be extrapolated across representative sections of the site to ensure that the site is on the correct anticipated trajectory.

The hydrological monitoring network has been designed to consider several key factors including the rehabilitation measure, peat thickness and anticipated water levels post-rehabilitation, while also ensuring adequate spatial coverage across the site to assist in characterising the hydrological profile in transects across each bog. Loggers have been targeted towards locations where the measures represent areas with larger footprints, while also targeting specific features of interest (e.g., mineral mounds or targeted placement in areas anticipated to become wetlands).

Hydrological Monitoring in Knappoge Bog

Fourteen piezometer nests have been installed in Knappoge Bog, four of which consist of phreatic/deep well pairs installed at the interface of the peat and underlying inorganic deposits, respectively. Of the fourteen phreatic monitoring locations, seven have been instrumented with automated data loggers (Rugged Troll 100) recording groundwater temperature and water level at 15-minute intervals (Resolution 0.01m). No deep well was installed with an automated data logger. There have been four rounds of Hydrological Monitoring completed at Knappoge Bog between summer 2021 and summer 2023. Further monitoring was also carried out in Aug 2024, Feb 2025 and Aug 2025, however this data has not yet been fully analysed.

A review of logger data to 2023 for wells 006s and 013s on Knappoge was carried out. Rehabilitation works commenced around KNP_006_S in October 2022 and around KNP_013_S in August 2022. Outfall levels were adjusted and pumps decommissioned in July 2023.

Analysis of the logger data shows no change in the trend of water levels since the completion of rehabilitation measures in these areas. At well 006s the water levels fluctuate between 0.6m below the surface and ground level in summer 2021 and 2022 and then the water levels stabilise and remain more consistent between the winter months. The rehabilitation measures commenced in October 2022 but there appears to be no change in the water levels at this well location. The trend looks as though it will remain the same for the duration of the summer 2023 months also as the water levels dropped back down to around 0.6m in June when the logger data was collected. At well 006s there also appears to have been no impact from the rehabilitation works which commenced in August 2022. The water levels remained the same with the baseline sitting at around 0.6m below the surface and peaks water levels of 0.2m below the surface in the winter periods and 0.3m below the surface in the summer periods. The rehabilitation measures were not completed on this site during this period which is possibly why there had been no impact on the water levels.

More thorough analysis will be carried out by reviewing the data collected on Knappoge and other bogs in 2024 and 2025. This analysis will be completed over the coming months.

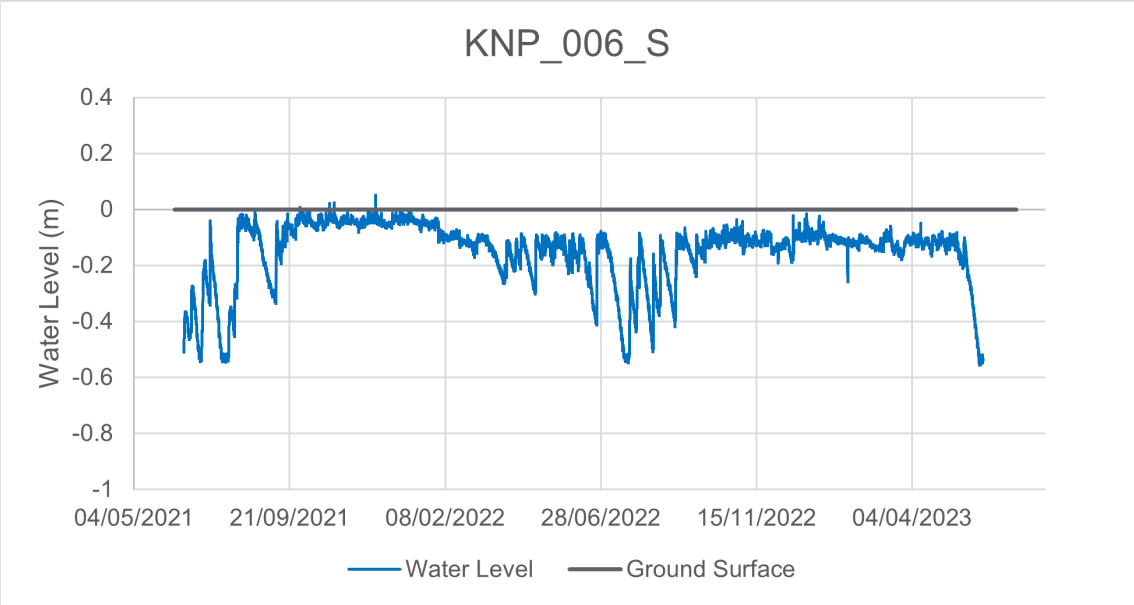

Figure 7.4.1 Hydrograph of the Monitoring Well at KNP_006_S

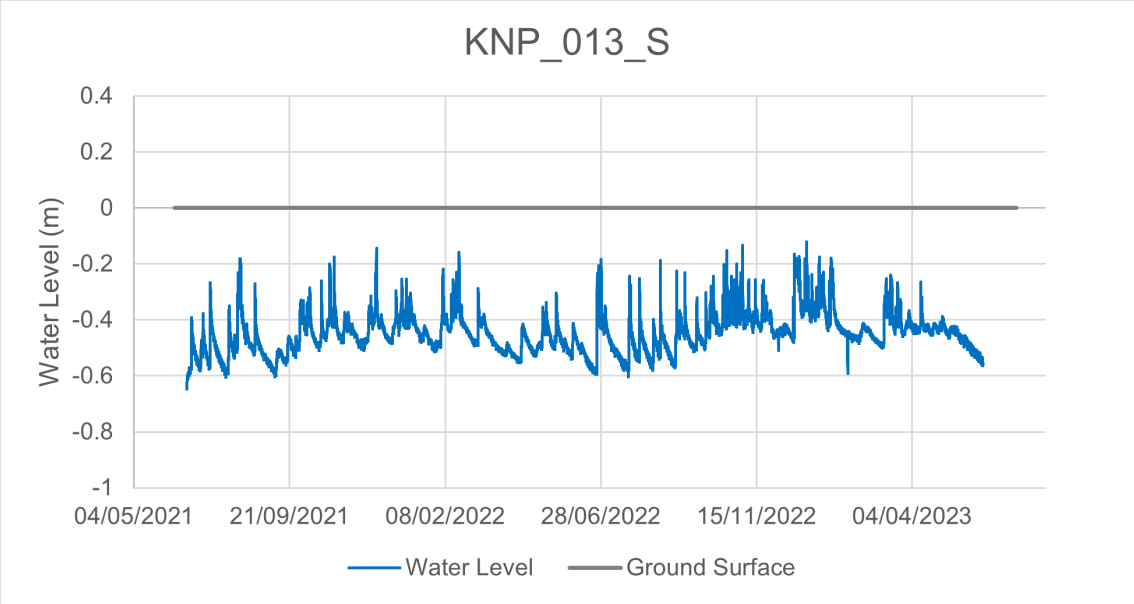

Figure 7.4.2 Hydrograph of the Monitoring Well at KNP_013_S

7.5. Ecology:

Vegetation and Habitats Summary

Table 7.5.1. Habitat Findings Summary, Winter Bird Monitoring Summary.

Attribute	Re-wetting status	Trajectory October 2025	Observations (Oct 2025 based on available imagery and/or site visits where applicable)
Vegetation and habitats	Completed	Much of the site is has established pioneer habitats and is maturing. No significant change in vegetation cover since 2023. Vegetation development and habitats expected to lag after re-wetting	• The rehabilitation of Knappoge bog has increased the extent of re-wetting across the bog and has set the site on a trajectory towards developing natural functioning wetland, peatland and some woodland habitats. • Conditions across the bog have changed post rehabilitation. There is now a greater extent of re-wetted peat, more stable seasonal variations in the extent of rewetting and ultimately optimisation of the hydrological regime. • No indications of recent changes to more established habitats in response to rehabilitation measures since 2023. • The site was already largely vegetated with no obvious change in vegetation composition to established habitats in the past 2 years. • Re-wetting has consolidated suitable conditions for expected fen and wetland habitat development, along with wetter established Downy birch dominated woodland.
Wintering birds		No significant change	• Some wintering bird usage already established. • It is too soon to establish any increase in species richness or abundance directly attributable to rehabilitation. • Potential links to European Sites – in time Knappoge may contribute to further habitat for SCI species and support the conservation objectives for nearby EU sites.

Rehabilitation has been carried out at Knappoge Bog between August 2022 and July 2023. It is too soon for habitats at Knappoge to reflect significant post rehabilitation change or vegetation/habitat succession. Measures have been relatively successful in improving re-wetting across the site. These measures will encourage the expansion of existing fen and wetland habitats at this site.

Now, the site has re-wetted and revegetated and is developing a suite of cutaway wetland, peatland and some woodland habitats. The majority of the former peat production footprint is a mosaic of open water, wetland habitat, or pioneering bare peat and contains blocked drainage channels post rehabilitation. Re-wetting will help consolidate changes in environmental condition that continue to encourage the continued development of fen, wetland and peatland pioneer vegetation at this site in the re-wetted parts of this site in the future.

Figure 7.5.1. Typical habitats across Knappoge including large areas of open water and wetland, with fen, along with pioneer vegetation and scrub in drier sections. Most of the site is now colonised. The greenway will be constructed along the former industrial railway (December 2024).

8. AFTERCARE AND MAINTENANCE

As per Rehabilitation Plan. No change.

9. DECOMMISSIONING

Decommissioning of peatlands encompasses the removal of all infrastructure, plant, equipment, materials, and wastes.

The quantities available for decommissioning are identified on Geographic Information System (GIS), for example: rail, pump sites, tea centres, silt ponds etc.

Waste items not identified on GIS i.e., redundant machinery, scrap metal, polythene, polybrane and pipes are located and added to the clean-up schedule using survey-based apps (Survey123). All records surveyed are managed on the BnM GIS mapping system. Materials/ waste items are then removed from the bog for either reuse or recycling to approved licenced waste management facilities.

The Knappoge bog was firstly surveyed March 2022. Decommissioning is ongoing. To date, 50% of waste items to include plant, equipment, materials and general waste were removed from the bog. A total of 462 hectares are confirmed cleaned with the final 462 hectares pending completion. In addition, all rail totalling 4.8km's was fully decommissioned. The two pumps servicing the northern and western catchments were decommissioned. Currently all surface waters freely drains to known discharge point.

All waste and associated weights, volumes, EWC codes and final destinations are reported to the Agency as part of the Annual Monitoring Report (AER) and the Environmental Performance Report (EPR).

10. CHALLENGES AND LESSONS LEARNED

Knappoge previously had a pumped drainage regime and was therefore relatively straight-forward to re-wet Two pumps were decommissioned between 2018-2020. This had significant positive impacts of creating large wetlands in the basins that the pumps had previously pumped. Some additional work was required to create a berm along the north-west margin to avoid the risk of water leaking from the new wetland into adjacent cutover bog and turbary. Water-levels are now managed via an outfall that has been adjusted in height to support the wetland while also avoiding risks that water-levels will become too high and impact on adjacent land. Rehabilitation during 2023 was focused on targeting the remaining areas and blocking drains across the more elevated areas where drainage was still active.

11. AMENDMENTS TO THE KNAPPOGE REHABILITATION PLAN

There were no significant amendments to the Knappoge Rehabilitation Plan. Rehabilitation was implemented as per the Rehabilitation Plan with the exception of additional constrained areas where no measures had previously been proposed within marginal areas. A number of other minor changes in rehabilitation type were made after rehabilitation commenced due to ground conditions encountered on the ground, however, these changes were minimal.

12. REFERENCES

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Appendix A
Knappoge Bog Two Year Review
GIS Map Book 2025

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Figure Appendix A- 1. Aerial photo of Knappoge Bog 2020.

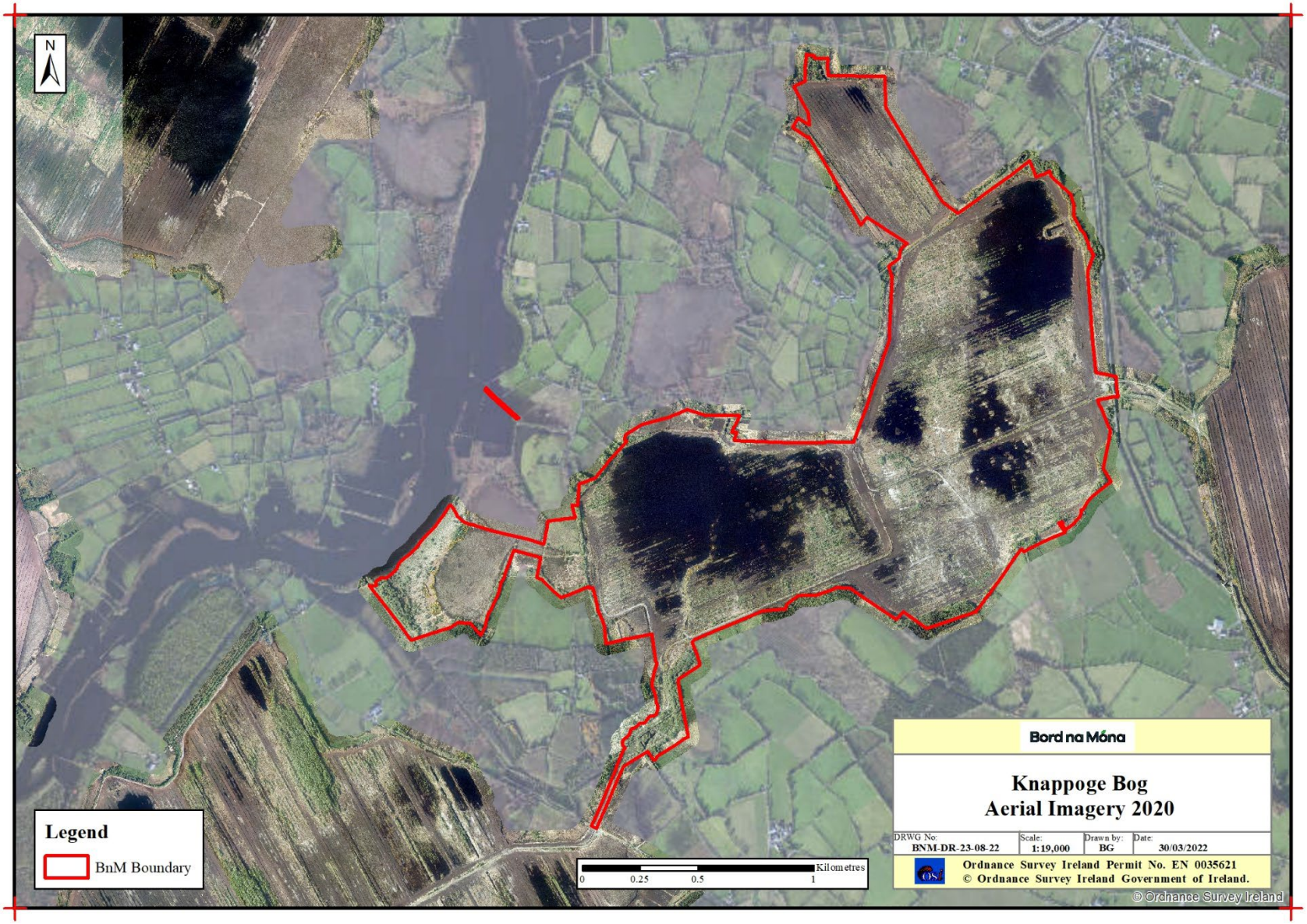

Figure Appendix B-2. Aerial photo of Knappoge Bog 2022, post rehabilitation.

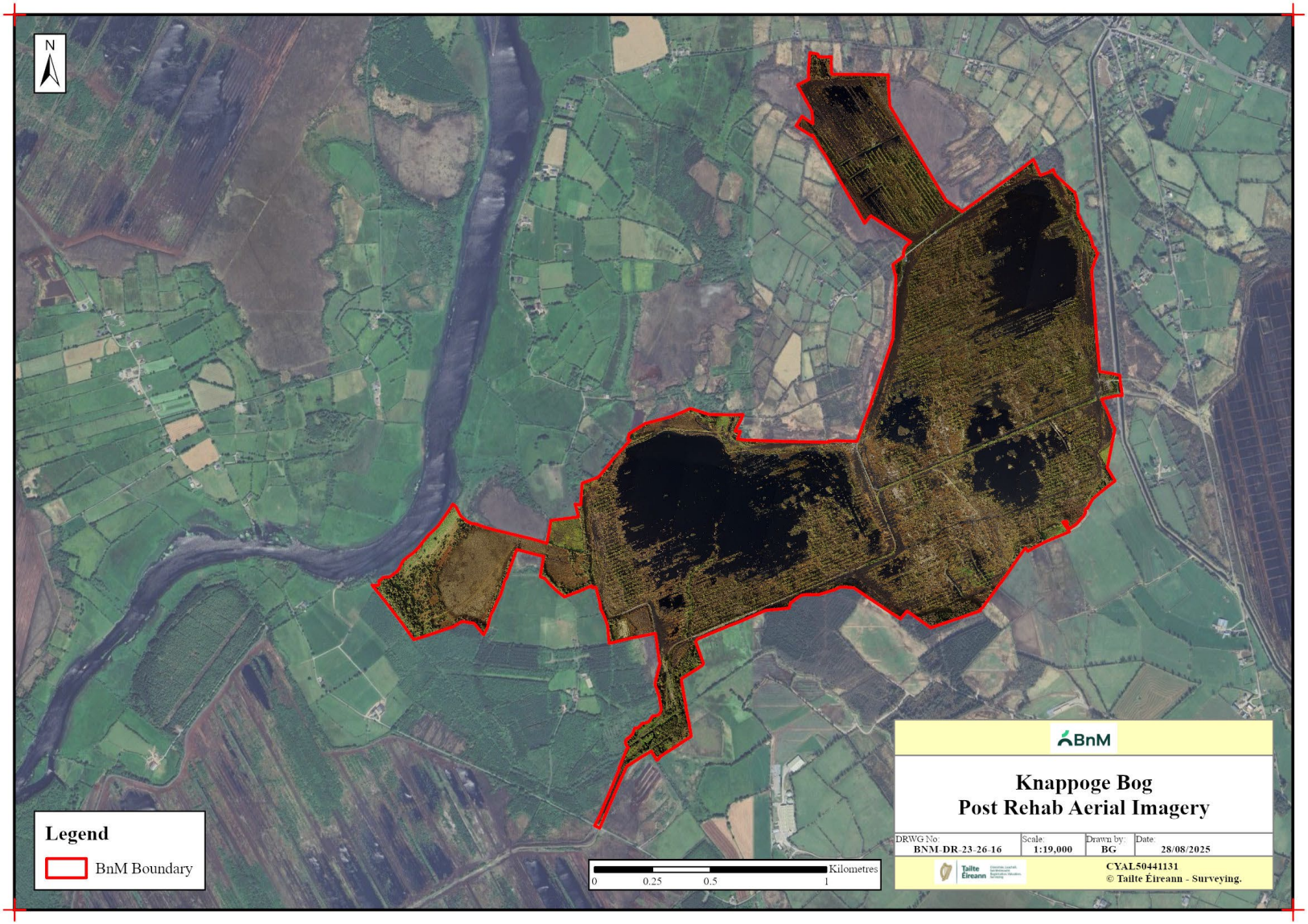

Figure Appendix B-3. Knappoge Bog as completed rehab measures.