Bloch Wind Farm

Technical Appendix 9.5: Groundwater Dependant Terrestrial Ecosystems Assessment

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Contents

1. Introduction

As part of Chapter 9: Hydrology, Hydrogeology, Geology and Soils of the Environmental Impact Assessment Report (EIA Report), this document presents an assessment of the proposed infrastructure at Bloch Wind Farm (the proposed development) on Groundwater Dependant Terrestrial Ecosystems (GWDTE).

The Water Framework Directive 2000/60/EC (WFD) requires those terrestrial ecosystems that are dependent on groundwater to be identified and the pressures acting on them analysed. Assessments are required to identify, assess and if necessary provide mitigation measures to protect sensitive wetland ecosystems that could be at risk from identified activities.

The Scottish Environment Protection Agency (SEPA) has prepared planning guidance[1] [2] which details a standard approach to the assessment of GWDTE and their potential disruption. SEPA require that all measures that will be employed to protect sensitive GWDTE in the proximity to the works be detailed. A series of buffer distances are utilised in the guidance to identify the difference between specific work activities; 100m buffer of all excavations less than 1m in depth; and 250m of all excavations deeper than 1m. Within the guidance, there is a list of habitat communities detailed which are either 'moderately' or 'highly' groundwater dependent, subject to certain hydrogeological settings.

The purpose of this document is to identify 'potential' GWDTE using habitat survey information and to further assesses the 'likelihood' of groundwater dependency based on ecological, geological, hydrogeological and topographical context. Once GWDTE have been identified, potential impacts will be assessed which could occur from construction and operation of the proposed development. This will be achieved by providing a detailed site-specific risk assessment for proposed infrastructure within the buffer distances. Based on the above information an assessment of potential effects for each of these zones has been presented that takes account of industry good practice mitigation.

Information on the hydrology, geology, hydrogeology, soils and topography can be found in Chapter 9: Hydrology, Hydrogeology, Geology and Soils of the EIA Report.

2. Methodology

The GWDTE assessment has been completed by undertaking the following:

- Completion of a National Vegetation Classification (NVC) study and classification of these communities in line with SEPA LUPS 4 & 31 to identify potential GWDTE;
  - The NVC walkover survey was undertaken in 2022 and covered the red line boundary for the proposed development. The identified habitats were classified based on the NVC descriptions in Rodwell (1991)[3] and mapped in the field, with percentages used to proportion mosaics where multiple communities were present. Further details can be found in Chapter 7: Ecology, Volume 1 of the EIA Report and Technical Appendix 7.1: Phase 1 and NVC Habitat Survey 2022 in Volume 3 of the EIA Report;
  - For discussion in Section 3.1.1 and 3.1.2, the survey area is the GWDTE SEPA LUPS31 search area (black line) as displayed in Figure 9.8a: Potential GWDTE in Volume 2 of the EIA Report. The site is defined as the area bounded by the site boundary (red line). The Phase 1 and NVC survey was undertaken within the

[1] SEPA (2017) Land Use Planning System Guidance Note 31, Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Terrestrial Ecosystems, version 3.

[2] SEPA (2017) Land Use Planning System (LUPS) Guidance Note 4: Planning Guidance on Onshore Windfarm Developments

[3] Rodwell, J.S. (1991) British Plant Communities. Volumes 1-5. Cambridge University Press.

site plus a 100m buffer totalling 17.8 kilometres (km^2) as displayed in Figure 7.3 and Figure 7.4 in Volume 2 of the EIA Report;

- An assessment of these habitats within the context of the geology, slope, topography, soil cover and watercourses;
- A zone of contribution was delineated for each area of possible GWDTE which falls within the SEPA LUPS buffer. Zones of contribution were determined by a desk-based assessment considering the situation of natural watercourses, topography, and the assumption that groundwater is flowing from high to low elevation with similar topographic constraints to surface watercourses;
- Completion of an assessment that utilises the information from the elements above to establish the actual presence of GWTDE; and
- Should the assessment determine the presence of actual GWDTE, where required, details will be provided for the provision of specific mitigation measures.

For all areas identified as actual GWDTE an assessment was made of the likely impact of the proposed infrastructure associated with the proposed development. This assessment highlights where there will be direct and indirect impacts on GWDTE, this is:

- Direct impacts – Infrastructure is situated on an area of actual GWDTE resulting in direct loss of habitat, and posing a clear pollution hazard; and
- Indirect impacts – Infrastructure is situated upgradient of an area of actual GWDTE risking disruption of groundwater flow pathways which recharge the GWDTE and posing a reasonable pollution hazard.

3. Results

3.1. NVC Study and Potential GWDTE Assessment

For the purpose of this assessment only the NVC communities within the buffer distances from the permanent and temporary infrastructure have been considered. Table 3.1 identifies the NVC communities with potential for groundwater dependence determined based on their SEPA GWDTE Classification[1].

Table 3.1: Identified NVC Communities with potenital for groundwater dependency

NVC Community	NVC Community Name	Potential Groundwater Dependency
M6	*Carex echinata - Sphagnum recurvum/auriculatum* mire	High
M16	*Erica tetralix - Sphagnum compactum* wet heath	High
M23	*Juncus effusus/acutiflorus - Galium palustre* rush-pasture	High
M25	*Molinia caerulea - Potentilla erecta* mire	Moderate
M27	*Filipendula ulmaria - Angelica sylvestris* mire	Moderate
MG10	*Holcus lanatus - Juncus effusus* rush-pasture	Moderate
W7	*Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum* woodland	High

The locations and the extent of the recorded potential GWDTE communities situated within respective 100m and 250m buffers for proposed infrastructure elements are presented in Figure 9.8a: Potential GWDTE in Volume 2 of the EIA Report. Polygons with a dominant cover of potential moderately groundwater dependent NVC communities or sub-communities are shaded yellow, and polygons with a dominant cover of potential highly groundwater dependent NVC communities or subcommunities are shaded red.

A short summary of the distribution of these habitats is presented below.

3.1.1. Potentially Moderately Dependent Habitats

M25 – Wet Modified Bog

The M25a sub-community purple moor grass is present across the survey area in abundance. Wet modified bog is an abundant community covering 15% of the site.

M27 – Marshy Grassland

The M27c sub-community meadowsweet is only present in a small section of the survey area located to the west of the proposed compound. Marshy grassland is the most abundant community covering 33% of the site.

MG10 – Neutral Grassland

The MG10a rush-pasture sub-community is present in scattered areas across the survey area, the largest section to the west of T16. Semi-improved neutral grassland covered 18% of the site and was more dominant in the lower areas of site and to the northern edge of the site.

3.1.2. Potentially Highly Dependent Habitats

M6 – Acid / Neutral Flush

The M6d sub-community is present in a few small areas across the survey area. Only a small and scattered area of acid flush was recorded covering <0.5% of the site.

M16 – Wet Heath

The M16a sub-community (*Erica tetralix - Sphagnum compactum wet heath*) is mainly located in the central section of the survey area surrounding Viewy Knowe at 198m AOD and covered 4% of the site.

M23 – Rush Pasture

The M23a sub-community soft-sharp flowered rush and marsh bedstraw is located in proximity to the Bloch Burn and Back Burn catchments and is often associated with drainage ditches on upland pasture.

The M23a habitat was grouped in with the marshy grassland habitat and is the most abundant community covering 33% of the site.

W7 – Woodlands

The W7 NVC community is located to the southern boundary of the survey area where recent planting has been undertaken. Broad-leaved woodland covered <1% of the site.

3.2. GWDTE Assessment

A total of 183 potentially moderately or highly groundwater dependent habitat parcels were identified within the relevant 100m and 250m buffer distances for the proposed development infrastructure. Of those identified, 66 were classified as potentially highly dependent with a total area of 107ha and 117 were classified as potentially moderately dependent with a total area of 292ha.

The SNIFFER (2007)[4] guidance states that the dependence of wetlands on groundwater bodies is a result of the hydrological connectivity. The degree of dependency will vary depending upon whether the wetland is underlain by

[4] Scotland & Northern Ireland Forum for Environmental Research. 2007 Wetland Hydrogeomorphic Classification for Scotland. Available at: http://www.envirobase.info/PDF/SNIFFER_WFD66_Final_Report.pdf

a low productivity or high productivity aquifer and whether there is a hydrological linkage mechanism between groundwater and the surface wetland. Therefore, the determination of likely groundwater dependence is a function of the communities setting spatially within the landscape and the corresponding hydrological setting. To this end, an assessment of likely groundwater dependency has been undertaken for GWDTE communities based on the site-specific hydrological setting combined with the GWDTE decision tool published by Botaneco (2016)[5]:

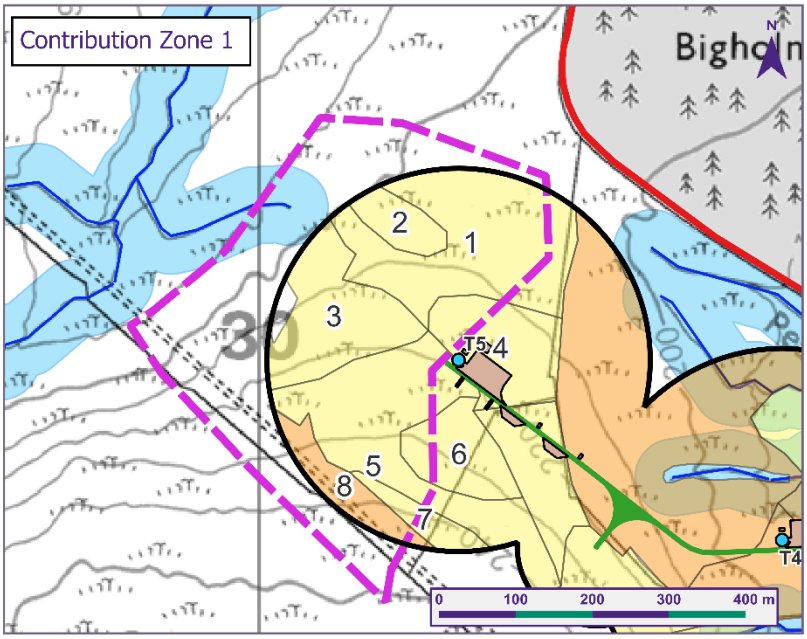
- Where GWDTE vegetation is evidently influenced by groundwater discharge, likely dependency will be high. Identifying features include water appearing in the absence of surface water features at a point source spring head (M31, M32 & M33), more diffuse sources such as a flush (M6, M23, M31, M32 & M33) or floristic indicators of base enrichment (M10, M11, M37 & M38).
- Where GWDTE vegetation is associated with surface water features, likely dependency will be no more than moderate and is likely to be low. Identifying features include association with seeps, sills or runnels; upslope / upstream presence of ombrotrophic bog / mire (wet heath or blanket bog); situated away from likely groundwater rises (flat areas, topographic highs) or where they are situated in a watercourse, floodplain, or other ponding locations.
- Where GWDTE vegetation is associated within ombrotrophic systems (rain-fed), likely dependency will be no more than moderate and is likely to be low. Identifying features include; the presence of M6 or M25 in close association with M15 and / or M20; upslope / upstream presence of ombrotrophic bog / mire (wet heath or blanket bog); situated away from likely groundwater rises (flat areas, topographic highs) and the presence of peat (>0.5m in thickness). Where these habitats occur within artificial drainage ditches groundwater dependence is likely to be low or even not dependent.

The individual areas of GWDTE within the nine identified contribution zones is presented in Table 3.2 to Table 3.10. The areas identified as actual GWDTE are presented in Figure 9.8b in Volume 2 of the EIA Report. Good practice and embedded design mitigation will be required and outlined within the Construction Environmental Management Plan (CEMP) (further details available in Technical Appendix 2.1 in Volume 3 of the EIA Report) with the following mitigation considerations pertinent to the protection of GWDTE:

- Drainage - maintain surface water and shallow groundwater flow through good design of site drainage, including installation of cross drainage at regular intervals along access tracks that allows flow to be maintained.
- Runoff and sediment management – all site runoff will be adequately attenuated and treated prior to discharge back into natural drainage network;
- Pollution control – Standard good practice for the storage of fuels and oils will be implemented at the proposed development to protect receptors including GWDTE from pollution; and
- Avoidance - Micro-siting towards actual GWDTE will be avoided where possible, regular checks and monitoring will be undertaken by the Principal Contractor and ECoW.

[5] Botaaneco 2016. GWDTE Decision Tool. Available at: https://drive.google.com/file/d/1_q0Tjh9TfzLFUdDoczt7SP-dZLMv8w1L/view (accessed 19/10/2022)

Table 3.2: Contribution Zone 1

Plan	Infrastructure summary
 Site boundary SEPA LUPS31 GWDTE buffer Proposed turbine Proposed track Watercourses Proposed cranepad 50 m watercourse buffer GWDTE contribution zone 1 Potential GWDTE (as per LUPS 31) High Moderate	• NVC habitat polygon 4 contains T5, crane hardstand and access track. • NVC habitat polygon 5 situated upgradient. • No other proposed infrastructure within contribution zone.

Potential GWDTE summary		
Eight areas of potential GWDTE identified within contribution zone 1 (as presented on plan above)	1. M25a 2. M25a 3. M25a 4. M25a	5. M25a 6. M25a 7. M25a 8. M23a

Hydrological and hydrogeological information

Contribution zone 1 is within the Collin Burn catchment with minor artificial drainage channels also present which are likely to have modified natural flow patterns.

Collin Hags (255m Above Ordnance Datum (AOD)) to the south is the main topographic constraint that channels surface and groundwater to Collin Burn.

Bedrock geology[6] consists of sedimentary rocks of the Ballagan Formation – sandstone, siltstone and dolomitic limestone. This is a moderately productive aquifer[7] with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration. There is a fault line mapped running NW to SE directly below T5.

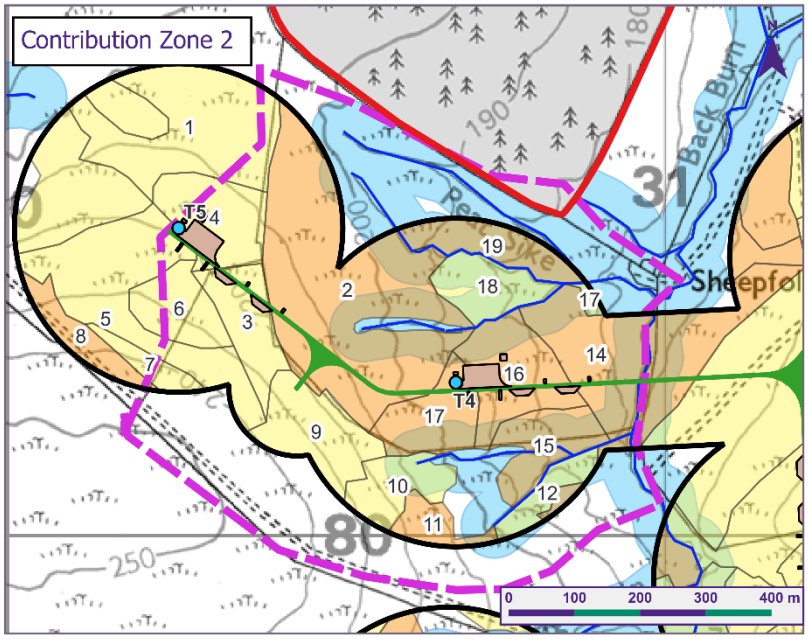
[6] British Geological Survey, BGS 1:50k Bedrock, Available at: Map | Scotland's environment web (accessed 17/10/2022)

[7] British Geological Survey, Aquifer Classification, Available at: Map | Scotland's environment web (accessed 17/10/2022)

Plan	Infrastructure summary
Soils[8] are characterised as peaty gleys. Peat depths were ~≤0.5m.	
GWDTE assessment	
The steeper topography is likely to channel any groundwater flow to the topographic low point of the Collin Burn watercourse. Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry. Given the topographic high positioning of the M25a habitat (NVC habitat polygons 1-7) and the likely low infiltration capacity of the underlying bedrock, dependency it is likely to be associated with ombrotrophic systems (receiving runoff and rainfall or overland flow) and has been given an actual assessment of **low groundwater dependency**. The M23a habitat (NVC habitat polygon 8) has been given a **moderate dependency** and is often associated with drainage ditches on upland pasture. Drainage ditches and shallow seepage were evident in this area and overland flow pathways are significant.	
Impacts and mitigation	
NVC habitat polygons 1, 2 and 3 are located downgradient of T5 and crane hardstand. This could result in indirect impact as a result of disruption to groundwater flow. NVC habitat polygon 4 underlies T5, crane hardstand and access track. NVC habitat polygon 5 is predominately upgradient but intersects T5 partially. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygons 6, 7 and 8 are upgradient of infrastructure, therefore mitigation through avoidance in the event of micro-siting is recommended.	

[8] National Soil Map of Scotland: generalised Soil Type, Available at: Scotland's Soils - soil maps (environment.gov.scot) (accessed 17/10/2022)

Table 3.3: Contribution Zone 2

Plan	Infrastructure summary
 © Crown Copyright 2022. All rights reserved. Ordnance Survey Licence 0100031673. Site boundary SEPA LUPS31 GWDTE buffer Proposed turbine Proposed track Watercourses Proposed cranepad 50 m watercourse buffer GWDTE contribution zone 2 Potential GWDTE (as per LUPS 31) High Moderate	Proposed infrastructure consists of the following: • T5 and crane hardstand; • T4 and crane hardstand; and • Access track.

Potential GWDTE summary		
19 areas of potential GWDTE identified within contribution zone 2 (as presented on plan above)	1. M25a 2. M23a 3. M25a 4. M25a 5. M25a 6. M25a 7. M25a 8. M23a 9. M25a 10. M25a 11. M23a	12. MG10a 13. M23a (numbered label unable to be displayed on inset map but NVC habitat polygon directly below 12) 14. M23a 15. M23a 16. M23a 17. M23a 18. MG10a 19. M23a

Hydrological and hydrogeological information
Contribution zone 2 is within the Back Burn catchment with artificial drainage channels also present which have modified natural flow patterns. Lang Grain Head (225m AOD) to the south is the main topographic constraint that channels surface and groundwater to Back Burn.

Plan	Infrastructure summary

Bedrock geology consists of sedimentary rocks of the Ballagan Formation – sandstone, siltstone and dolomitic limestone. This is a moderately productive aquifer with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration.

Soils are characterised as peaty gleys. Peat depths were <0.5m.

GWDTE assessment

The steeper topography is likely to channel any groundwater flow to the topographic low point of the Back Burn watercourse.

Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry.

Given the topographic high positioning of the M25a habitat (NVC habitat polygons 1, 3, 4, 5, 6, 7, 9 and 10) it is likely associated with ombrotrophic systems (receiving runoff and rainfall) and has been given an actual assessment of **low groundwater dependency**. Drainage ditches are evident in this area and overland flow pathways are significant.

The MG10a habitat (NVC habitat polygons 12 and 18) are in close proximity to the headwater streams and is in mosaic with the rush pasture M23a habitat (NVC habitat polygons 2, 8, 11, 13, 14, 15, 16, 17 and 19) and has been assigned **moderate dependency**. These habitats are likely to be reliant upon surface water and shallow groundwater seepage.

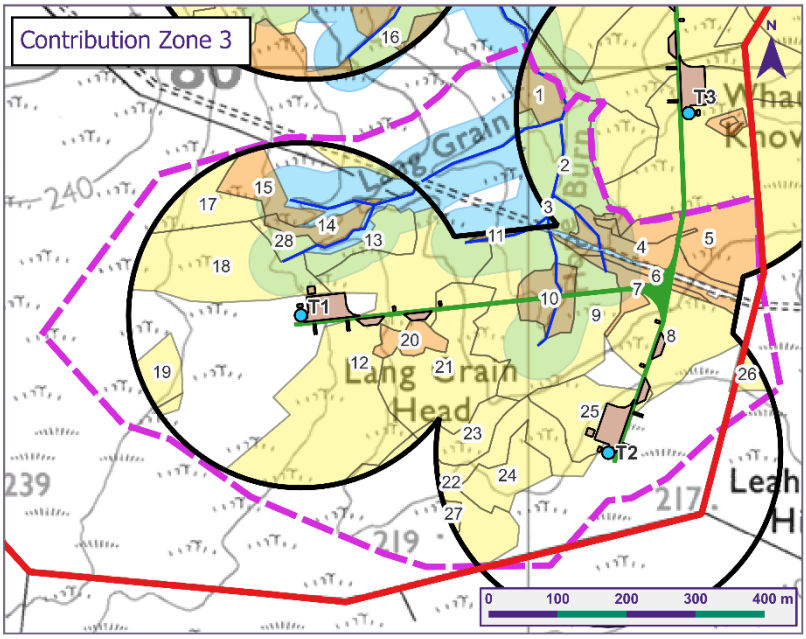
Impacts and mitigation

NVC habitat polygons 18 and 19 are located downgradient of T4 and crane hardstand. NVC habitat polygon 1 is located downgradient of T5 and crane hardstand. This could result in an indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent.

NVC habitat polygon 4 underlies T5, crane hardstand and access track. NVC habitat polygon 5 is predominately upgradient but intersects T5 partially. NVC habitat polygons 16 and 17 underlie T4, crane hardstand and access track. NVC habitat polygon 3 is partially within T4 crane hardstand and access track. NVC habitat polygons 2, 9 and 14 are partially within the access track. This could result in direct impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent.

NVC habitat polygons 6, 7, 8, 10, 11, 12, 13, 15 and 16 are upgradient of infrastructure, therefore mitigation through avoidance in the event of micro-siting is recommended.

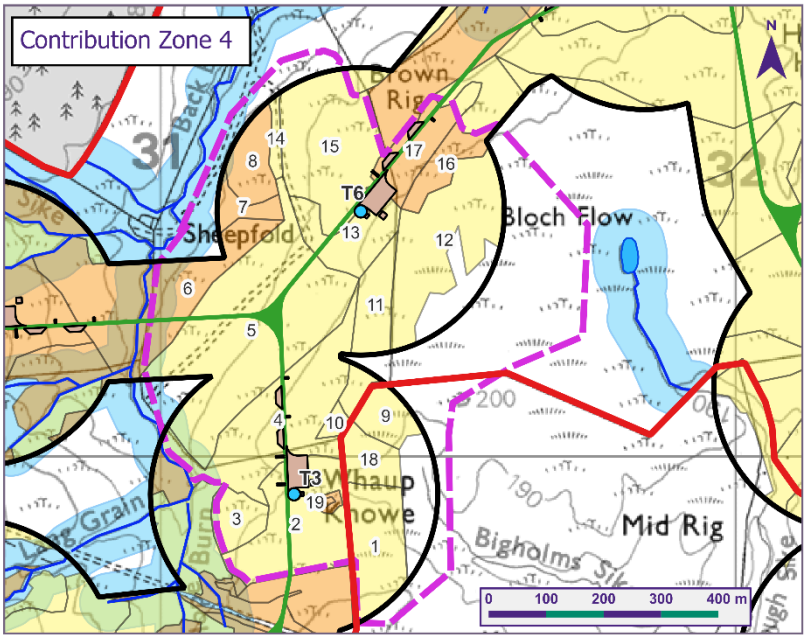
Table 3.4: Contribution Zone 3

Plan	Infrastructure summary
 © Crown Copyright 2022. All rights reserved. Ordnance Survey Licence 0100031673. Site boundary SEPA LUPS31 GWDTE buffer Proposed turbine Proposed track Watercourses Proposed cranepad 50 m watercourse buffer GWDTE contribution zone 3 Potential GWDTE (as per LUPS 31) High Moderate	Proposed infrastructure consists of the following: • T1 and crane hardstand; • T2 and crane hardstand; and • Access track.

Potential GWDTE summary		
28 areas of potential GWDTE identified within contribution zone 3 (as presented on plan above)	1. M23a 2. M25a 3. M23a 4. M23a 5. M23a 6. M23a 7. M23a 8. M25a 9. M25a 10. M23a 11. M23a 12. M25a 13. M25a 14. M23a 15. M23a	16. MG10a (numbered label unable to be shown on inset map but north of NVC habitat polygon 14 and continuation of habitat mapped in contribution zone 2) 17. M25a 18. M25a 19. M25a 20. M6d 21. M25a 22. M25a 23. M25a 24. M25a 25. M25a 26. M25a 27. M25a 28. M25a

Plan	Infrastructure summary
Hydrological and hydrogeological information	
Contribution zone 3 is within the Back Burn catchment with artificial drainage channels also present which have modified natural flow patterns. This contribution zone bisects the headwaters of the Back Burn catchment. The Lang Grain Head (225m AOD) channels surface and groundwater to Back Burn. Bedrock geology consists of sedimentary rocks of the Border Group – sandstone, siltstone and mudstone. This is a moderately productive aquifer with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration. Soils are characterised as peaty gleys. Peat depths were <=0.5m in the central section of the contribution zone at Lang Grain Head. At the turbine locations peat depths of ~1.5m were recorded.	
GWDTE assessment	
Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) were identified. Soils are also waterlogged. The MG10a habitat (NVC habitat polygon 16) is in close proximity to the headwater streams and is in mosaic with the rush pasture M23a habitat (NVC habitat polygons 1, 3, 4, 5, 6, 7, 10, 11, 14 and 15) and has been assigned **moderate groundwater dependency** on account of possible shallow seepage from adjacent watercourses. Given the topographic high positioning of the M25a habitat (NVC habitat polygons 2, 8, 9, 12, 13, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27 and 28) and M6d habitat (NVC habitat polygon 20), these are likely to be associated with an ombrotrophic systems (receiving runoff and rainfall) and has been given an actual assessment of **low groundwater dependency.**	
Impacts and mitigation	
NVC habitat polygons 13, 14, 15, 17 and 28 are located downgradient of T1 and crane hardstand. NVC habitat polygons, 1, 2, 3, 11 and 16 are located downgradient of the access track. This could result in indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygon 18 partially underlies T1 crane hardstand. NVC habitat polygon 4, 5, 6, 7, 8, 9, 10, 12 and 21 intersect the access track. NVC habitat polygon 25 partially underlies T2 crane hardstand. This could result in direct impacts to GWDTE due to construction. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygons 19, 20, 22, 23, 24, 26 and 27 are upgradient of infrastructure, therefore mitigation through avoidance in the event of micro-siting is recommended.	

Table 3.5: Contribution Zone 4

Plan	Infrastructure summary
 © Crown Copyright 2022. All rights reserved. Ordnance Survey Licence 0100031673. Site boundary SEPA LUPS31 GWDTE buffer Proposed turbine Proposed track Watercourses Proposed cranepad 50 m watercourse buffer GWDTE contribution zone 4 Potential GWDTE (as per LUPS 31) High Moderate	Proposed infrastructure consists of the following: • T3 and crane hardstand; • T6 and crane hardstand; and • Access track.

Potential GWDTE summary		
20 areas of potential GWDTE identified within contribution zone 4 (as presented on plan above)	1. M25a 2. M25a 3. M25a 4. M25a 5. MG10a 6. M23a 7. M23a 8. M23a 9. M25a 10. M25a	11. M25a 12. M25a 13. M25a 14. MG10 15. M25a 16. M23a 17. M23a 18. M25a 19.M23a 20.M6d (not shown on map but next to 19)

Hydrological and hydrogeological information
Contribution zone 4 is within the Back Burn catchment. NVC habitat polygons 1, 9 and 10 are within the Hall Burn catchment. Artificial drainage ditches are present which have modified the natural drainage patterns. Lang Grain Head (225m AOD) to the south is the main topographic constraint that channels surface and groundwater to Back Burn. Mid Rig (190m AOD) to the south-east is the main topographic constraint that channels surface and groundwater to Hall Burn.

Plan	Infrastructure summary

Bedrock geology consists of sedimentary rocks of the Ballagan Formation – sandstone, siltstone and dolomitic limestone. To the south of Whaup Knowe the bedrock is mapped as sedimentary rick of the Border Group – sandstone, siltstone and mudstone. These are moderately productive aquifers with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration.

Soils are characterised as peaty gleys. Peat depths were <=0.5m. A section of deeper peat (2.5 - 3.0m) was found to the south of T3.

GWDTE assessment

Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry.

The MG10a habitat (NVC habitat polygons 5 and 14) are in relative proximity to the riparian zone and is in mosaic with the rush pasture M23a habitat (NVC habitat polygons 6, 7, 8, 16, 17 and 19) and has been assigned **moderate groundwater dependency** on account of possible shallow seepage from adjacent watercourses.

Given the topographic high positioning of the M25a habitat (NVC habitat polygons 1, 2, 3, 4, 9, 10, 11, 12, 13, 15 and 18) and M6d habitat (NVC habitat polygon 20) it is likely associated with ombrotrophic systems (receiving runoff and rainfall) and has been given an actual assessment of **low groundwater dependency**.

Impacts and mitigation

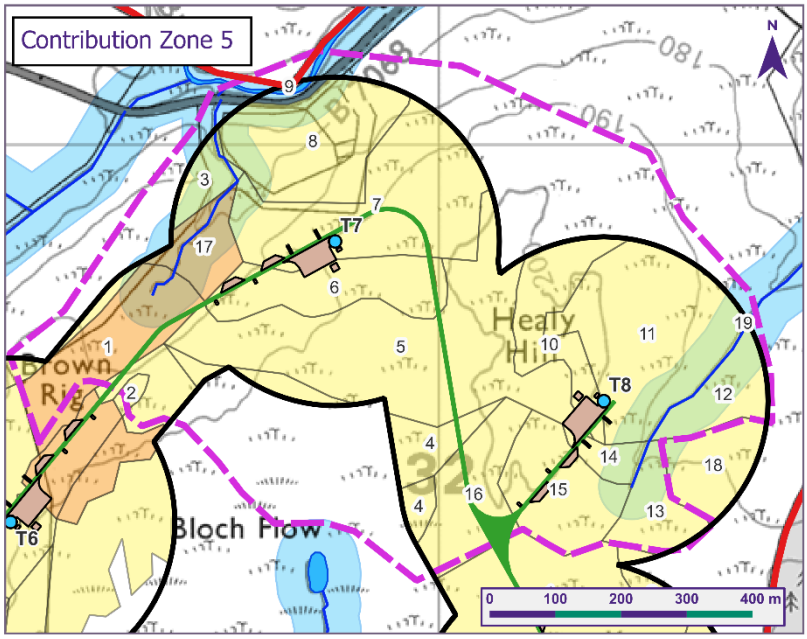
NVC habitat polygons 3, 7, 8 and 14 are located downgradient of the access track. This could result in indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent.

NVC habitat polygon 4 partially underlies T3 and crane hardstand. NVC habitat polygon 2 underlies T3 and crane hardstand. NVC habitat polygons 5 and 6 intersect the access track. NVC habitat polygon 13 and 15 underlies T6 and crane hardstand. NVC habitat polygon 17 underlies T6 crane hardstand and access track. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent.

NVC habitat polygons 1, 9, 10, 11, 12, 16, 18, 19 and 20 are upgradient of infrastructure, therefore mitigation through avoidance in the event of micro-siting is recommended.

Table 3.6: Contribution Zone 5

Plan	Infrastructure summary



Site boundary
SEPA LUPS31 GWDTE buffer
Proposed turbine
Proposed track
Watercourses
Proposed cranepad
50 m watercourse buffer
GWDTE contribution zone
5
Potential GWDTE (as per LUPS 31)
High
Moderate

Proposed infrastructure consists of the following:

- T7 and crane hardstand;
- T8 and crane hardstand; and
- Access track.

Potential GWDTE summary

19 areas of potential GWDTE identified within contribution zone 5 (as presented on plan above)

1. M23a
2. M25a
3. MG10a
4. M25a
5. M25a
6. M25a
7. M25a
8. MG10a
9. M23a
10. M25a
11. MG10a
12. M25a
13. M25a
14. M25a
15. M25a
16. M25a
17. M23a
18. M25a
19. MG10a

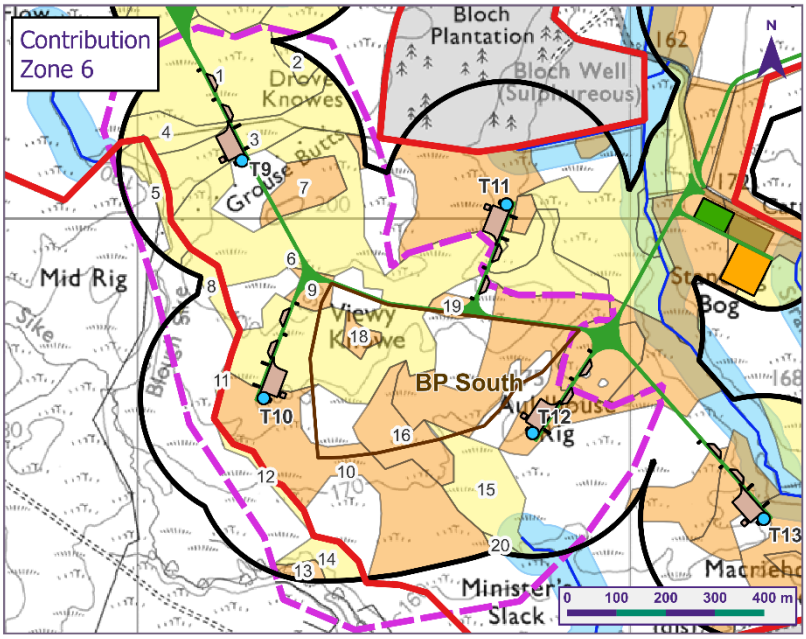
Hydrological and hydrogeological information

Contribution zone 5 is within the Cow Sike catchment with artificial drainage channels also present which have modified natural flow patterns.

Healy Hill (202m AOD) to the east and Bloch Flow to the south (195m AOD) are the main topographic constraints that channels surface and groundwater to Cow Sike.

Plan	Infrastructure summary
Bedrock geology consists of sedimentary rocks of the Ballagan Formation – sandstone, siltstone and dolomitic limestone. This is a moderately productive aquifer with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration. Soils are characterised as peaty gleys. Peat depths were <=0.5m surrounding T7 and T8. A large expanse of deeper peat surrounded Bloch Flow (1.5 - > 3m).	
GWDTE assessment	
Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry. Given the presence of deeper peat in this area, the M25a modified bog habitat is unlikely to be groundwater dependant (NVC habitat polygons 2, 4, 5, 6, 7, 10, 12, 13, 14, 15, 16 and 18). The dependence on groundwater inputs is considered to be **low**. The MG10a habitat (NVC habitat polygons 3, 8, 11 and 19) are in relative proximity to the riparian zone and is in mosaic with the rush pasture M23a habitat (NVC habitat polygons 1, 9 and 17). The occurrence of peat within the area, combined with the occurrence of drainage ditches within the area would suggest these habitats are fed as a result of shallow seepage and overland flow. As a result of these factors, dependence of vegetation on groundwater input has been assigned as no more than **moderate groundwater dependency**.	
Impacts and mitigation	
NVC habitat polygons 3 and 17 are located downgradient of the access track. NVC habitat polygons 8 and 9 are downgradient of T7. NVC habitat polygons 12, 13 ,18 and 19 are located downgradient of T8. This could result in indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygons 6 and 7 underlie T7 and crane hardstand. NVC habitat polygons 10, 11, 14 and 15 underlie T8 and crane hardstand. NVC habitat polygons 1, 4, 5 and 16 intersect the access track. This could result in direct impacts to GWDTE due to construction. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygon 2 is upgradient of infrastructure, therefore mitigation through avoidance in the event of micro-siting is recommended.	

Table 3.7: Contribution Zone 6

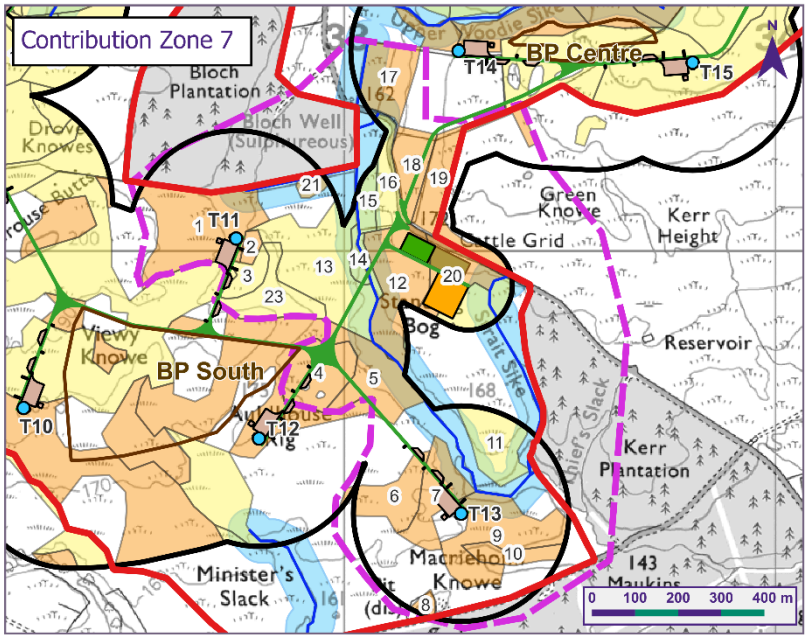
Plan	Infrastructure summary
 Site boundary SEPA LUPS31 GWDTE Buffer Proposed turbine Proposed track Watercourses Proposed cranepad Proposed temporary construction compound Proposed borrow pit Proposed substation Proposed battery storage compound 50 m watercourse buffer GWDTE contribution zone 6 Potential GWDTE (as per LUPS 31) High Moderate	Proposed infrastructure consists of the following: • T9 and crane hardstand; • T10 and crane hardstand; • T12 and crane hardstand; • Borrow Pit South; and • Access track.

Potential GWDTE summary		
20 areas of potential GWDTE identified within contribution zone 6 (as presented on plan above)	1. M25a 2. M25a 3. M25a 4. M25a 5. M25a 6. M25a 7. M16a 8. M25a 9. M16a 10. M16a	11. M25a 12. M25a 13. W7 14. M25a 15. M25a 16. M16a 17. M16a (label not visible on inset map but habitat polygon underlies BP South and T12) 18. M16a 19. M16a 20. M25a

Hydrological and hydrogeological information
Contribution zone 6 is within the Hall Burn catchment with artificial drainage channels also present which have modified natural flow patterns.

Plan	Infrastructure summary
Mid Rig (190m AOD) to the west and Viewy Knowe to the east are (201m AOD) are the main topographic constraint that channels surface and groundwater to Hall Burn. Bedrock geology consists of sedimentary rocks of the Border Group – sandstone, siltstone and mudstone. This is a moderately productive aquifer with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration. Soils are characterised as peaty gleys. Peat depths were variable within this contribution zone. Peat depths were <=0.5m surrounding T10. Peat depths in borrow pit south were in the range of 0.5 – 1.0m. Deeper areas of peat were located at T9 and to the south east of T12 (1.5 – 3.0m).	
GWDTE assessment	
Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry. Given the presence of deeper peat in this area, the M25a modified bog habitat (NVC habitat polygons 1, 2, 3, 4, 5, 6, 8, 11, 12, 14, 15 and 20) and M16a wet heath (degraded blanket bog) (NVC habitat polygons 7, 9, 10, 16, 17, 18 and 19) are unlikely to be groundwater dependant. Base enrichment as a result of spring rises is considered unlikely, which is supported by the absence of any indicating habitats. Dependence on groundwater inputs is considered to be **low**. The W7 woodland community (NVC habitat polygon 13) has remained **high dependency** given the hydrological setting within the riparian zone of the Blough Sike.	
Impacts and mitigation	
NVC habitat polygon 2 is downgradient of T9. This could result in indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygons 1, 3 and 4 underlie T9 and crane hardstand. NVC habitat polygon 6 underlies T10, crane hardstand, Borrow Pit South and access track. NVC habitat polygons 7, 9 and 19 intersect the access track. NVC habitat polygon 10 underlies Borrow Pit South and T10. NVC habitat polygon 15 is partially within Borrow Pit South. NVC habitat polygons 16 and 18 underlie Borrow Pit South. The NVC habitat polygon 17 underlies Borrow Pit South and T12, crane hardstand and access track. This could result in direct impacts to GWDTE due to construction. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygons 5, 8, 11, 12, 13, 14 and 20 are upgradient of infrastructure, therefore mitigation through avoidance in the event of micro-siting is recommended.	

Table 3.8: Contribution Zone 7

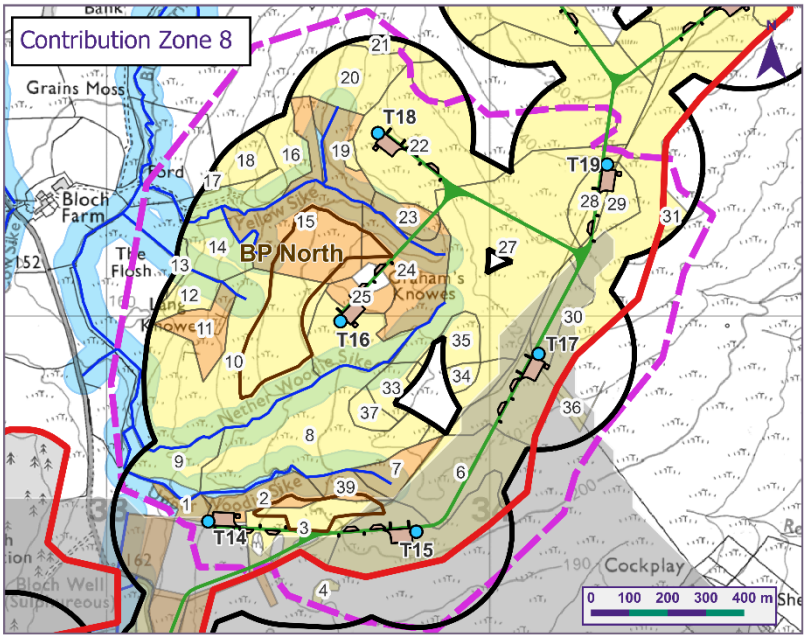
Plan	Infrastructure summary
 © Crown Copyright 2022. All rights reserved. Ordnance Survey Licence 0100031673. Site boundary SEPA LUPS31 GWDTE Buffer Proposed turbine Proposed track Watercourses Proposed cranepad Proposed temporary construction compound Proposed borrow pit Proposed substation Proposed battery storage compound 50 m watercourse buffer GWDTE contribution zone 7 Potential GWDTE (as per LUPS 31) High Moderate	Proposed infrastructure consists of the following: • T11 and crane hardstand; • T13 and crane hardstand; • Substation, construction compound and battery storage compound; and • Access track.

Potential GWDTE summary		
23 areas of potential GWDTE identified within contribution zone 7 (as presented on plan above)	1. M16a 2. M6d 3. M25a 4. M16a 5. M16a 6.M16a 7. M16a 8. W7 9.M16a 10.M6d 11.M25a	12.M23a 13.M25a 14.M25a 15.M27c 16.MG10a 17.M23a 18.M23a 19.M23a 20.M23a 21. M16a 22. M27c (label not visible on inset mat but habitat polygon next to habitat polygon 14) 23.M25a

Hydrological and hydrogeological information

Plan	Infrastructure summary
Contribution zone 7 is within the Kerr Burn catchment with artificial drainage channels also present which have modified natural flow patterns. Drove Knowes (190m AOD) is the main topographic constraint that channels surface and groundwater to Kerr Burn. Bedrock geology consists of sedimentary rocks of the Border Group – sandstone, siltstone and mudstone. This is a moderately productive aquifer with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low, potentially discouraging infiltration. Soils are characterised as peaty gleys to the west and peaty gleys with blanket peat to the east. Peat depths were variable within this contribution zone and were mostly in the 0.5 – 1.0m range. The deepest areas of peat were located to the east of T11 and to the south east of T12 (2.5 - >3m).	
GWDTE assessment	
Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however the site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry. Given the presence of deeper peat in this area, the M25a modified bog habitat (NVC habitat polygons 3, 11, 13, 14 and 23) and M16a wet heath (degraded blanket bog) (NVC habitat polygons 1, 4, 5, 6, 7, 9 and 21) are unlikely to be groundwater dependant. Dependence on groundwater inputs is considered to be **low**. The M6d flush habitat (NVC habitat polygon 2 and 10) is in proximity to water is likely associated with ombrotrophic systems (receiving runoff and rainfall) and has been given an actual assessment of **low groundwater dependency.** The MG10a habitat (NVC habitat polygon 16) is in mosaic with M27c marshy grassland (NVC habitat polygon 15) in proximity to the riparian zone. The occurrence of peat within the area, combined with the occurrence of drainage ditches within the area would suggest these habitats are fed as a result of shallow seepage and overland flow. The M23a rush pasture (NVC habitat polygon 12, 17, 18, 19, 20 and 22) is associated with drainage ditches on upland pasture. As a result of these factors, dependence of vegetation on groundwater input has been assigned as no more than **moderate dependency**. The W7 (NVC habitat polygon 8) has been giving moderate dependency given the location on an area of deeper peat (1.5 – 3.0m) and topographic high positioning.	
Impacts and mitigation	
NVC habitat polygon 8, 10, 11, 15, 17, 19, 21 are downgradient of proposed infrastructure. This could result in indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygon 1, 2 and 3 partially underlies T11 and crane hardstand. NVC habitat polygon 6, 7 and 9 partially underlies T13 and crane hardstand. NVC habitat polygons 12 and 20 underlie the compounds. NVC habitat polygons 4, 5, 13, 14, 16, 18, 22 and 23 intersect the access track. This could result in direct impacts to GWDTE due to construction. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent.	

Table 3.9: Contribution Zone 8

Plan	Infrastructure summary
 Site boundary SEPA LUPS31 GWDTE Buffer Proposed turbine Proposed track Watercourses Proposed cranepad Proposed borrow pit 50 m watercourse buffer GWDTE contribution zone 8 Potential GWDTE (as per LUPS 31) High Moderate	Proposed infrastructure consists of the following: • T14 and crane hardstand; • T15 and crane hardstand; • T16 and crane hardstand; • T17 and crane hardstand; • T18 and crane hardstand; • T19 and crane hardstand; • Borrow Pit Centre; • Borrow Pit North; and • Access track.

Potential GWDTE summary		
39 areas of potential GWDTE identified within contribution zone 8 (as presented on plan above)	1. M23a 2. M23a 3. M25a 4. M25a 5. M25a (label not visible on inset map but habitat polygon underlies T15) 6.M25a 7. M23a 8. MG10a 9.MG10a 10.MG10a 11.M23a 12.MG10a 13.M25a 14.M25a 15.M23a	20.MG10a 21.MG10a 22.M25a 23.M6d 24.M23a 25.M16a 26.MG10a (label not visible on inset map but habitat polygon underlies T16) 27.M25a 28.M25a 29.M25a 30.M25a 31.M25a 32.M25a (label not visible on inset map but habitat polygon underlies T17)

Plan		Infrastructure summary
	16.MG10a	33.M25a
	17.MG10a	34.M25a
	18.MG10a	35.M25a
	19.M23a	36.M25a
		37.M25a
		38. MG10a (label not visible on inset mat but habitat polygon next to habitat polygon 19)
		39. M23a

Hydrological and hydrogeological information

Contribution zone 8 is within the Bloch Burn catchment with artificial drainage channels also present which have modified natural flow patterns. NVC habitat polygons 4, 5, 6, 30 and 32 are within the Kerr Burn catchment.

Graham's Knowe to the east (221m AOD) and Bloch plantation to the west (162m AOD) are the main topographic constraint that channels surface and groundwater to Bloch Burn. Drove Knowes (190m AOD) is the main topographic constraint that channels surface and groundwater to Kerr Burn.

Bedrock geology consists of sedimentary rocks of the Whita sandstone beds – sandstone. This is a moderately productive aquifer with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration.

Soils are characterised as peaty gleys with blanket peat. Peat depths were variable within this contribution zone and were mostly in the <=0.5m range. The deepest areas of peat were located along the access track from T15 to T17 (1.5 - 2.0m), the access track to T16 (2.0 - >3m) and surrounding T19 (1.5 - 2.0m).

GWDTE assessment

Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry.

Given the presence of deeper peat in the area, the M16a wet heath (degraded blanket bog) (NVC habitat polygon 25) has been assigned low groundwater dependency. The M6d flush habitat (NVC habitat polygon 23) is in proximity to water is likely associated with ombrotrophic systems (receiving runoff and rainfall) and has been given an actual assessment of **low groundwater dependency**.

Given the presence of deeper peat in this area, the M25a modified bog habitat is unlikely to be groundwater dependant (NVC habitat polygons 3, 4, 5, 6, 13, 14, 22, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36 and 37), the likely dependence on **groundwater is considered moderate** at most. The M23a flush habitat is present in the area (NVC habitat polygons 1, 2, 7, 11, 15, 19, 24 and 39). Given the location of the habitats either situated away from likely groundwater rises (flat areas, topographic highs) or within watercourses that will support shallow groundwater seepage, the likely dependence on **groundwater is considered moderate** at most.

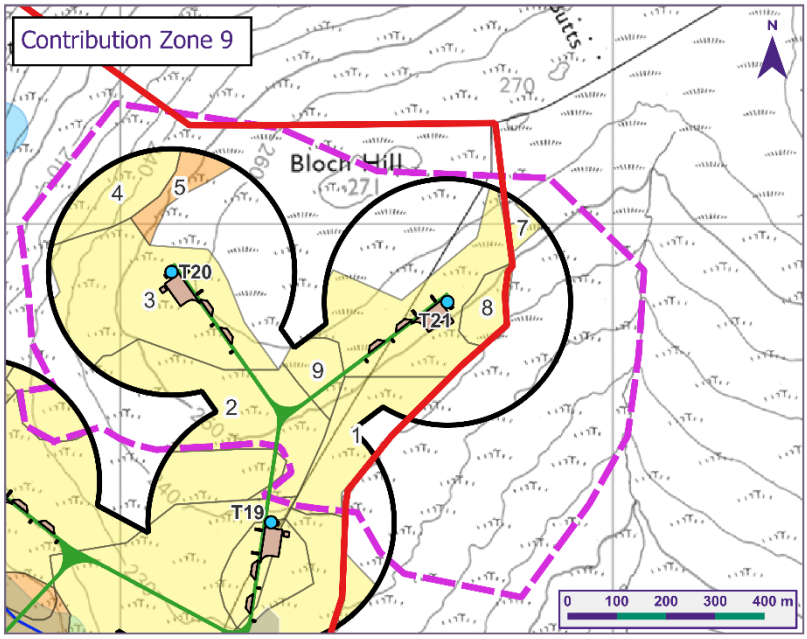
The occurrence of peat within the area, combined with the occurrence of drainage ditches within the area would suggest the MG10a habitats (NVC habitat polygon 8, 9, 10, 12, 16, 17, 18, 20, 21, 26 and 38) are fed as a result of shallow seepage and overland flow / convergence of surface drainage. As a result of these factors, dependence of vegetation on groundwater input has been assigned as no more than **moderate dependency**.

Impacts and mitigation

NVC habitat polygon 4 is downgradient of Borrow Pit Centre. NVC habitat polygons 11, 12, 13 and 14 are downgradient of Borrow Pit North. NVC habitat polygon 36 is downgradient of T17 and crane hardstand. NVC habitat polygons 16, 17, 18, 19, 20, 21 and 38 are downgradient of T18 and crane hardstand. NVC habitat polygon 31 is downgradient of T19. NVC habitat polygons within the central section of site (5, 7, 8, 9, 33, 34, 35

Plan	Infrastructure summary
	and 37) are downgradient of proposed turbines and access tracks. This could result in indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygons 10 and 15 underlie Borrow Pit North. NVC habitat polygons 3 and 39 underlie Borrow Pit Centre. NVC habitat polygon 1 partially underlies T14 and crane hardstand. NVC habitat polygon 2 underlies Borrow Pit Centre and T14 and crane hardstand. NVC habitat polygons 25 and 26 underlies T16 and crane hardstand. NVC habitat polygons 30 and 32 intersect T17, crane hardstand and access track. NVC habitat polygon 22 underlies T18 and crane hardstand. NVC habitat polygon 28 and 29 underlies T19 and crane hardstand. NVC habitat polygons 6, 23, 24 and 27 intersect the access track. This could result in direct impacts to GWDTE due to construction. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent.

Table 3.10: Contribution Zone 9

Plan	Infrastructure summary
 Site boundary SEPA LUPS31 GWDTE Buffer Proposed turbine Proposed track Watercourses Proposed cranepad 50 m watercourse buffer GWDTE contribution zone 9 Potential GWDTE (as per LUPS 31) High Moderate	Proposed infrastructure consists of the following: • T20 and crane hardstand; • T21 and crane hardstand; and • Access track.

Potential GWDTE summary		
Nine areas of potential GWDTE identified within contribution zone 9 (as presented on plan above)	1. M25a 2. M25a 3. MG10a 4. MG10a 5. M16a	6.M25a (label not visible on inset map but habitat polygon underlies T21) 7.M25a 8.M25a 9. M25a

Hydrological and hydrogeological information
Contribution zone 9 is within the Bloch Burn catchment to the west (T20) and Irvine Burn to the east (T21). Bloch Hill (271m Above Ordnance Datum (AOD)) is the main topographic constraint that separates the two catchments. Artificial drainage ditches are mapped within the catchment and will have modified natural drainage patterns. Bedrock consists of sedimentary rocks of the White sandstone beds – sandstone. This is a moderately productive aquifer with groundwater flow predominately through fractures and other discontinuities. Away from fractures intergranular permeability will be low potentially discouraging infiltration. Soils are characterised as peaty gleys with blanket peat. Peat depths were 1.0-2.0m at T20 and access track and 0.5-1.0 at T21 and access track.

GWDTE assessment

Plan	Infrastructure summary
The steeper topography is likely to channel any groundwater flow to the topographic low point of the Bloch Burn and Irvine Burn watercourse. Hydrogeological information indicates that groundwater flow is possible within the moderately productive aquifer, however no spring type habitats (i.e. M32) or NVC communities indicating more diffusely emerging base enrichment were identified. Peaty soils are characteristically waterlogged however site surveys confirmed that the drainage ditches present across the survey area were effective at keeping the site dry. Given the presence of deep peat and topographic high positioning of the M25a habitat (NVC habitat polygons 1, 2, 6, 7, 8 and 9) it is likely associated with ombrotrophic systems (receiving runoff and rainfall) and has been given an actual assessment of **low groundwater dependency**. The MG10a (NVC habitat polygons 3 and 4) and M16a (NVC habitat polygon 5) has been given an actual assessment of **moderate dependency**. The occurrence of peat within the area, combined with the occurrence of drainage ditches within the area would suggest these habitats are fed as a result of shallow seepage and overland flow / convergence of surface drainage.	
Impacts and mitigation	
NVC habitat polygon 1 is downgradient of the access track. NVC habitat polygons 4 and 5 are located downgradient of T20 and crane hardstand. NVC habitat polygons 7 and 8 are downgradient of T21. This could result in indirect impact as a result of disruption to groundwater flow. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent. NVC habitat polygons 2 and 9 intersect the access track. NVC habitat polygon 3 underlies T20 and crane hardstand. NV habitat polygon 6 underlies T21 and crane hardstand. This could result in direct impacts to GWDTE due to construction. Standard good practice and embedded design mitigation including the use of cross drains will be required for these areas of GWDTE. Further details are provided within the Outline CEMP Technical Appendix 2.1 in Volume 3 of the EIA Report, and finalised details will be provided in the CEMP post-consent.	

4. Conclusion

The GWDTE assessment presented in Section 3.2 has evaluated a number of NVC communities identified in SEPA LUPS Guidance as being potentially groundwater dependent. In most cases, the habitats are associated with artificial or natural overland drainage features or wetting as a result of rainfall and stagnation. Furthermore, whilst the bedrock is noted to have some increased permeability, there is a notable absence of floristic indicators for spring or diffuse base enrichment suggestive of groundwater. Where true groundwater dependence has been identified, habitats are generally shallow and close to surface waters or topographic re-entrants. In the case of the former, the adoption of 50m watercourse buffers serves to provide mitigation through avoidance in the first instance. In the case of the latter and also for watercourse crossings, standard good practice and embedded design measures will maintain a continuity of flow, minimising alternation to natural drainage patterns.

Mitigation measures would be put in place to protect GWDTE with further details provided in Technical Appendix 2.1: Outline CEMP in Volume 3 of the EIA Report. Waterlogging across the site being is primarily a function of reduced infiltration capacity, topography and proximity to surface water channels. Based upon the assessment methodologies provided in the Chapter 9: Hydrology, Hydrogeology, Geology and Soils in Volume 1 of the EIA Report and Technical Appendix 2.1 which assumes the successful design and implementation of mitigation measures, the residual effects are considered to be **not significant**.

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