

**North Lowther Energy Initiative:  
Appendix 7.5:  
Groundwater Dependant Terrestrial  
Ecosystems**

*Prepared by*



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## Background

This appendix should be read in conjunction with **Chapter 7: Hydrology, Hydrogeology, Geology and Soils** and with reference to **Figure 7.8** of the ES.

The information within this appendix is for habitats categorised via the Phase 1 habitat surveys (undertaken by MacArthur Green, with full details are provided in **Chapter 8: Ecology** of the ES) as indicating that a wetland is likely to be highly groundwater dependent, solely via the National Vegetation Classification (NVC) of the habitat. As a result, these habitats were identified as potential high dependency groundwater dependent terrestrial ecosystems (GWTDEs).

The following assessment takes into account the following additional information derived from desktop studies and information gathered from site visits:

- Hydrogeological setting;
- Topography; and
- Drainage or local features that may alter groundwater levels.

From this information, the individual areas of habitat have been assessed, providing a revised groundwater dependency classification.

As per SEPA Guidance<sup>1</sup>, the potential high dependency GWTDEs assessed (shown on **Figure 7.8**) include those:

- Within 100m radius of all excavations less than 1m in depth; and
- Within 250m of all excavations deeper than 1m.

## Summary of the Assessment

In **Table 1** the 'Highly Dominant' initial groundwater dependency class represents vegetation that was dominant within the survey area, which is potentially of high groundwater dependency. The 'High Sub-Dominant' status reflects these NVC classes being represented in the survey area but not comprising the dominant vegetation type. Where areas are mixed, both classes have been identified.

The outcome after assessment is given in the 'Revised Groundwater Dependency Class' column of **Table 1**, following review all areas were considered to have low groundwater dependency and are not considered sensitive to groundwater alterations as a result of the Development.

Table 1. GWDTE Groundwater Dependency Assessment

GWDTE Area	Area (km <sup>2</sup> )	NVC Classes	Initial Groundwater Dependency Classes	Location Relative to Infrastructure	Comment	Revised Groundwater Dependency Class
1	0.04	MG10 M23 M23a	Highly Dominant	Access track passes through this area on the western slopes of Glenrae Dod, with borrow pit BP01 located in the central part of this area.	GWDTE habitats are situated on a sloping hillside and have been identified as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low
2	0.004	M23a	Highly Dominant	Located 40m downslope of proposed access track on north facing slope of Glenrae Dod.	GWDTE habitats are situated on a steep slope and have been identified as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low
3	0.01	U4 U6 M23a M25	Highly Dominant	Access track crosses upslope on south facing slope of Slough Hill. GWDTE is located upslope from Blairy Burn and Nicol Burn headwaters.	GWDTE habitats are situated on a steep slope and have been identified as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low
4	0.007	U4 M23a	Highly Dominant / Highly Sub-Dominant	Turbine 34 and 35 and associated infrastructure located upslope of GWDTE, at nearest point within 65m, on south facing slope of Reecleuch Hill. GWDTE is located upslope from Ree Cleuch headwater.	GWDTE habitats are situated on a steep slope underlain by impermeable till/peat and can be described as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low

<sup>1</sup> SEPA (2014). Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Retrieved April 2017 from: <http://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf>

GWDTE Area	Area (km <sup>2</sup> )	NVC Classes	Initial Groundwater Dependency Classes	Location Relative to Infrastructure	Comment	Revised Groundwater Dependency Class
5	0.01	MG10a M23a	Highly Dominant	Located directly east of existing track planned for upgrade at base of Clackleith Hill.	GWDTE habitats are located directly downslope of an existing track, surface water and precipitation are likely to act as the predominant water sources.	Low
6	0.03	U4 M23 M23a M25	Highly Dominant	Borrow pit BP02 is located upslope to north, at nearest point within 60m. Turbine 31 and hardstanding are located within 80m of the GWDTE.	GWDTE habitats are found in stands along Clackleith Burn underlain by low permeability till, surface generated runoff and precipitation are likely to act as the predominant water sources.	Low
7	0.04	M23a	Highly Dominant	GWDTE located at the base of Duntercleuch Rig, 160m downslope of Turbine 24 and associated infrastructure.	GWDTE habitats are found on steep sided slopes either side of Glenbuie Burn underlain by low permeability till and can be described as ombrotrophic, where surface water and precipitation are likely to act as the predominant water sources.	Low
8	0.04	M6c M23a	Highly Dominant / Highly Sub-Dominant	GWDTE located 85m north and downslope of Turbine 23 and associated infrastructure.	GWDTE habitats are found at the base of Duntercleuch Rig on a gentle sloping gradient following a tributary of Wanlock Water. Rain generated surface runoff from the surrounding low permeability geology has been identified as the predominant water source.	Low
9	0.15	U4 M23a M25	Highly Sub-Dominant	Low gradient habitat, with substation planned in centre of GWDTE, Turbine 28 and associated infrastructure located immediately adjacent to west.	GWDTE habitats are underlain by low permeability till and situated on a steep sided slope and can be classed as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low

GWDTE Area	Area (km <sup>2</sup> )	NVC Classes	Initial Groundwater Dependency Classes	Location Relative to Infrastructure	Comment	Revised Groundwater Dependency Class
10	0.01	M25	Highly Sub-Dominant	Access track intersects GWDTE, with Turbine 29 and associated infrastructure located 165m west and upslope.	GWDTE habitats are underlain by low permeability till and follow a tributary of the Clackleith Burn. The main water sources are considered to be rain generated runoff and precipitation.	Low
11	0.15	U4 U5 U20 M25	Highly Sub-Dominant	Located at the summit of Wedder Dod on north facing slope. Turbine 27, hardstanding and access track planned at this location.	GWDTE habitats are located on steep slopes where surface water and precipitation are likely to act as the predominant water sources.	Low
12	0.01	U20 M6 MG10 M23a	Highly Dominant	Access track intersects GWDTE on the south facing hillside of Duntercleuch Rig.	GWDTE habitats run along the flanks of Back Burn, rain generated runoff and precipitation are likely to act as the predominant water sources.  The local watercourse is likely to act as a drain and reduce groundwater level.	Low
13	0.05	U4 MG10 M25	Highly Sub-Dominant	Turbine 25 and associated infrastructure is located 85m west and upslope of GWDTE, to the west of Well Hill.	GWDTE habitats are situated on a sloping hillside and can be described as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low
14	0.02	MG10 M23 M25	Highly Sub-Dominant	Turbine 21 and associated infrastructure is located 160m north and upslope of GWDTE, on southern flanks of Well Hill.	GWDTE habitats are underlain by low permeability till and peat. Rain generated runoff and precipitation are likely to act as the predominant water sources.	Low

GWDTE Area	Area (km <sup>2</sup> )	NVC Classes	Initial Groundwater Dependency Classes	Location Relative to Infrastructure	Comment	Revised Groundwater Dependency Class
15	0.09	MG10 M23	Highly Sub-Dominant	Turbine 15 and associated infrastructure located 160m west and upslope of GWDTE. Access track intersects this habitat at the summit of Tongue Hill.	GWDTE habitats are underlain by low permeability till and situated on a steep sided slope and can be classed as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low
16	0.05	U4 MG10 M25	Highly Dominant / Highly Sub-Dominant	Located on the western slope of Lowmill Knowe, Turbine 19 is located 110m upslope and east, with Turbine 18 located 100m to the south west of the GWDTE.	GWDTE habitats are underlain by low permeability till and situated on a slope at the headwater of Glendulion Burn, rain generated runoff and precipitation are likely to act as the predominant water sources.  The local watercourse is likely to act as a drain and reduce groundwater level.	Low
17	0.02	M23a	Highly Dominant	Compound located 30m east of GWDTE, to the east of Nether Cog.	GWDTE habitats are underlain by low permeability till and situated on a gentle sloping gradient. Rain generated surface runoff from the surrounding low permeability geology and precipitation are likely to act as the predominant water sources.	Low
18	0.12	U4 U5 M23a	Highly Dominant / Highly Sub-Dominant	Borrow pits BP02 and BP03 located immediately east of GWDTE, with access track approaching Turbine 1 intersecting GWDTE east of Fingland Rig.	GWDTE habitats are underlain by low permeability till and situated on a gentle sloping hillside following the flanks of the Winter Cleuch watercourse. Rain generated runoff and precipitation are likely to act as the predominant water sources.  The local watercourse is likely to act as a drain and reduce groundwater level.	Low

GWDTE Area	Area (km <sup>2</sup> )	NVC Classes	Initial Groundwater Dependency Classes	Location Relative to Infrastructure	Comment	Revised Groundwater Dependency Class
19	0.15	U4 U20 M23 M23a M25	Highly Sub-Dominant	Borrow pit BP03 located immediately east of GWDTE, with Turbine 1 and associated access track intersecting GWDTE east of Fingland Rig.	GWDTE habitats are underlain by low permeability till/ peat and are situated on a steep hillside following the tributaries of the Cog Burn. Habitats can be described as ombrotrophic, where surface water and precipitation are likely to act as the predominant water sources.	Low
20	0.02	M20 M23a	Highly Dominant	Turbine 2 and associated infrastructure located 90m north and upslope of GWDTE.  Small area of GWDTE on summit of Conrig Hill, with access track located 80m north of this area.	GWDTE habitats can be described as ombrotrophic, where surface water and precipitation are likely to act as the predominant water sources.	Low
21	0.01	M6c M23 M23a	Highly Dominant	GWDTE on both flanks of Conrig Hill, with Turbine 4 and associated infrastructure located upslope on ridge, at nearest point 60m south west of GWDTE	GWDTE habitats are underlain by low permeability till/peat and located at the headwaters of Bogs Burn and Glenearn Cleuch. Rain generated runoff and precipitation are likely to act as the predominant water sources.  The local watercourses are likely to act as drains and reduce groundwater level.	Low

GWDTE Area	Area (km <sup>2</sup> )	NVC Classes	Initial Groundwater Dependency Classes	Location Relative to Infrastructure	Comment	Revised Groundwater Dependency Class
22	0.08	U5 M6 M6d M20 M23 M23a	Highly Dominant / Highly Sub-Dominant	GWDTE on both flanks of Conrig Hill, with Turbines 5 and 6 and associated infrastructure intersecting various GWDTE habitats, located both upslope and downslope.  At nearest point, GWDTE is located 100m north and downslope of Turbine 5, with Turbine 6 at a greater distance.	GWDTE habitats are underlain by low permeability till/ peat and located at the headwaters of Craigy Cleuch and Shiel Burn. Rain generated runoff and precipitation are likely to act as the predominant water sources.  The local watercourses are likely to act as drains and reduce groundwater level.	Low
23	0.05	U4 U5 H12	Highly Sub-Dominant	Turbines 7, 8 and 9 and associated infrastructure are located upslope of GWDTE on ridge line of Willowgrain Hill.  Turbine 9 is the closest infrastructure, located 50m west of GWDTE.	GWDTE habitats are underlain by low permeability till/ peat and located at the headwaters of Mossy Burn, Willow Grain and Burgess Grain watercourses. Rain generated runoff and precipitation are likely to act as the predominant water sources.  The local watercourses are likely to act as drains and reduce groundwater level.	Low
24	0.13	U4 U6 M6c	Highly Dominant / Highly Sub-Dominant	Turbine 11 and associated infrastructure is located within a mosaic of GWDTE habitats between Brown Hill and Wether Hill.	GWDTE habitats are underlain by low permeability till/ peat and located on the steep slopes of Brown Hill and Wether Hill. Habitats can be described as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low

GWDTE Area	Area (km <sup>2</sup> )	NVC Classes	Initial Groundwater Dependency Classes	Location Relative to Infrastructure	Comment	Revised Groundwater Dependency Class
25	0.07	U4 U5 M6 M23 H12	Highly Sub-Dominant	Turbine 14 and associated infrastructure is located on White Dod ridge, 40m south and upslope of GWDTE.	GWDTE habitats are underlain by low permeability till/ peat and located on the north facing steep slope of White Dod. Habitats can be described as drained ombrotrophic surfaces, where surface water and precipitation are likely to act as the predominant water sources.	Low