Denny to Wishaw Network Upgrade

Environmental Impact Assessment Report

Volume 3 Appendices

Appendix 9.6 Groundwater Dependent Terrestrial Ecosystems Assessment

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1.1 Introduction

GWDTEs are protected under the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act)[1]. They are considered as sensitive receptors and impacts to them can cause reduced status to the Groundwater Body under the River Basin Management Plan (RBMPs).

To assess GWDTEs and their potential risks there is some guidance produced by the Scottish Environment Protection Agency (SEPA) in August 2024 called '*Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems*'[2]. As recommended by SEPA's guidance on assessing impacts of developments on GWDTE[3], a phased approach has been undertaken.

Habitats have been identified from NVC surveys undertaken in spring to autumn 2025. The groundwater dependency level has been identified from Annex 1 of the UK Technical Advisory Group on the Water Framework Directive (UKTAG).

Using professional judgement and baseline information, it has then been assessed whether the NVC communities classifiable as GWDTEs are actually sourced from groundwater. All NVC communities identified as potentially groundwater dependent and located within the below buffer zones have been taken forward for assessment. Potential GWDTEs over superficial deposits are shown in Volume 2, Figure 9.7, and potential GWDTEs over bedrock are shown in Volume 2, Figure 9.8.

1.2 Assessment

Step 1 – Identify Groundwater Dependent Terrestrial Ecosystems

Due to the length of the Project, it was agreed with SEPA that the following buffers were applied to the proposed infrastructure:

- 10m radius of all activities;
- 50m radius of the uprated line and access tracks; and
- 250m of the new line and new line compounds.

All NVC communities identified as potentially groundwater dependent and located within the above buffer zones have been taken forward for assessment.

[1] Scottish Parliament. 2003. Water Environment and Water Services (Scotland) Act 2003 (asp 3). Available online at: https://www.legislation.gov.uk/asp/2003/3/contents [accessed January 2026]
[2] Scottish Environment Protection Agency (SEPA). 2024. Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems. Available online at: https://www.sepa.org.uk/media/i2cnr03k/guidance-on-assessing-the-impacts-of-developments-on-groundwater-dependent-terrestrial-ecosystems.docx [accessed January 2026]
[3] Scottish Environment Protection Agency (2024) *Guidance on Assessing the Impacts of Developments on Groundwater-Dependent Terrestrial Ecosystems*, August. Available at: https://www.sepa.org.uk/media/i2cnr03k/guidance-on-assessing-the-impacts-of-developments-on-groundwater-dependent-terrestrial-ecosystems.docx (accessed January 2026).

Ecological Assessment (Habitat and Vegetation Surveys)

Table 1presents the National Vegetation Classification (NVC) communities identified across the Project along with their corresponding groundwater dependency scores, as defined by UKTAG. These scores indicate the theoretical level of groundwater reliance for each vegetation type. However, a high dependency score does not automatically confirm that a habitat is groundwater-fed; actual dependency requires the presence of a groundwater source and supporting hydrogeological condition.

An importance has been given to each of the NVC types identified across the Project following the methodology laid out in Volume 1, Chapter 8 Biodiversity. When more than one NVC type is present within an area of potential GWDTE the highest importance has been given. Those deemed as 'unimportant' have been scoped out of further assessment.

Table 1 Groundwater Dependency Across NVC Communities

NVC Community	Groundwater Dependency Score	Importance	Relevant Works
M15	2	Moderate	CB, WB, AA
M15a	2	Moderate	CB, WB, AA
M15b	2	Moderate	CB, WB, AA
M15d	2	Moderate	CB, WB, AA
M23	2	Low	CB, WB, AA, Cumbernauld
M23a	2	Moderate	CB, WB, AA
M23b	2	Low	Bonnybridge, Cumbernauld, CB, WB, AA
M23x	2	Moderate	CB, WB, AA
M23 (Compact rush)	2		Cumbernauld, CB, WB, AA
M25	3	Low	CB, WB, AA
M25a	3	Low	CB, WB, AA
M25b	3	Low	CB, WB, AA
M25c	3	Moderate	CB, WB, AA
M25p	3	Low	CB
M27	2	Moderate	Bonnybridge, CB, WB, AA
M27c	2	Moderate	CB, WB, AA
M5	1	Moderate	CB, WB, AA
M6	1	Moderate	CB, WB, AA
M6b	1	Moderate	CB, WB, AA
M6c	1	Moderate	CB, WB, AA

Mx (Sedgre Mire)	N/A	Moderate	Cumbernauld, CB, WB, AA
S27a	3	Moderate	CB, WB, AA
U4	3	Low	CB, WB, AA
W1	2	Moderate	CB, WB, AA
W4	1	Low	CB, WB, AA, Cumbernauld
W4 (Wet Woodland)	1	Moderate	CB, WB, AA
W4b	1	Moderate	CB, WB, AA
W4c	1	Moderate	CB, WB, AA
W7	1	Moderate	CB, WB, AA
W7 (Poor)	1	Low	CB, WB, AA
W7b	1	Moderate	CB, WB, AA, Cumbernauld
W7c	1	Low	CB, WB, AA, Cumbernauld
W7c (Wet Woodland)	1	Moderate	CB, WB, AA

Groundwater Dependency

The vast majority of the Project is covered by superficial deposits, particularly till which has a low permeability. Higher permeability superficial deposits such as alluvium and raised marine deposits are also present across the Project, particularly in the north. The majority of the superficial deposits however, including those which typically have a higher permeability, have interbedded impermeable layers recorded, such as muds, clays and coal/seatearth. These layers are generally impermeable and will limit groundwater flow. Although water may be present within the superficial deposits, it is more likely that this will be perched water within the more permeable layers rather than groundwater from the bedrock, as indicated within borehole logs described within Chapter 9 Water Environment. Peat deposits are also present across the Project, but despite a high storativity will be rain fed rather than groundwater-fed. Therefore, due to the unlikelihood of interaction between habitats and groundwater where glaciofluvial, till, peat and raised marine deposits are present it is proposed that potential GWTDE where these superficial deposits are located are scoped out and not continued for further assessment.

The Clackmannan Group and Scottish Coal Measures are both moderately productive aquifers. Groundwater levels recorded range across the Project from 0.66 m below ground level (bgl) within till deposits near Denny North Substation, and 33m bgl near the WB route (recorded the day after a pumping test). Most levels recorded across the Project range between 2.7-7.8m bgl, which is relatively shallow. Therefore, there is a chance that where the bedrock is exposed there may be some potential GWDTEs. However, these are likely to be only partially groundwater dependent due to the majority of the overlying soils containing thick organic surface layers that can absorb or prevent groundwater from infiltrating.

There are nine springs identified across the Project, however only Spring 04 is situated within areas identified as potential GWDTEs (areas of M23b and M6c). It is likely that the NVC types

at this location are at least partially supported by the spring as well as surface water from a nearby watercourse.

Step 2 – Qualitative Assessment

A qualitive assessment is displayed within Table 2. The matrix described within the introduction of the SEPA guidance has been applied to evaluate the potential impact on these GWDTEs for the purposes of this assessment.

Works associated with access tracks, Cumbernauld and Bonnybridge substations and the CB, WB and AA routes will all require excavation. The deepest excavations will the new foundations along the WB route at a depth of 4m and the AA route which will require cables at a depth of 1.5m. The shallowest excavations are likely to be the access tracks, which will still necessitate removal of overlying soils and may require excavation depths to 0.5m. These activities have the potential to expose underlying aquifers to contaminants such as sediment-laden runoff or accidental chemical spillages. Excavations provide pathways for pollutants which can adversely impact groundwater quality, and consequently the quality of water feeding the GWDTE. However, with standard mitigation measures implemented through the Construction Environmental Management Plan (CEMP) as well as embedded mitigation, these risks can be significantly reduced.

Dewatering may also be required for each of the excavations; this could temporarily re-direct groundwater flow away from GWDTEs. However, this impact would only be during the construction period and the impact will be managed with mitigation. Once in operation the groundwater flow regime would resume to previous conditions.

The construction and presence of the Project have the potential to alter the groundwater and surface water flow within the catchment. Such changes could redirect water feeds to GWDTEs, by either reducing or increasing the amount of water to them. However, the use of channel drains for access tracks will help maintain flow continuity and will prevent obstruction by new structures. Similarly, excavations with similar materials as the original state should also reduce any long-term changes to the natural hydrogeological flow.

Without mitigation there is likely to be the loss of potential GWDTEs across the Project, notably communities with moderate ecological importance. However, the Project is dominated by low and common NVC communities, and all are unlikely to be entirely reliant on groundwater. Overall, there are relatively small areas of moderate and low importance NVC communities which may be impacted, and implementing micro-siting will help reduce the overall impact.

Overall, all impacts rank between negligible and low and therefore, no quantitative assessment is required.

Table 2 Assessment of Scoped In Potential GWDTEs*

Works	NVC Communities within Buffer	Likely Groundwater Dependency	How Important is it?	How much is it affected?	Impact
Route XR					

XR035	M23b (joint with M23a)	Low – situated on alluvium but likely supported by nearby watercourse.	Moderate	Negligible	Negligible
	M23a		Moderate	Negligible	Negligible
	M27b		Moderate	Negligible	Negligible
XR034	W1	Low – situated on alluvium but likely supported by nearby watercourse.	Moderate	Slightly	Low
	W7		Moderate	Slightly	Low
	M23b		Low	Slightly	Low
XR031	M23b	Moderate- Situated on small area of alluvium.	Low	Slightly	Low
	MG9		Low	Slightly	Low
Route XX					
XX031	M23b	Moderate- Situated on small area of exposed bedrock.	Low	Slightly	Low
XX003	M23b	Moderate- Situated on small area of exposed bedrock.	Low	Slightly	Low
	W7		Moderate	Slightly	Low
XX004	W6	Moderate- located on alluvium	Moderate	Negligible	Negligible
	M23b (joint with M23a)		Moderate	Slightly	Low
	M23a		Moderate	Slightly	Low
XX003	M23b (joint with Mg9)	Low – situated on alluvium but likely supported by	Low	Slightly	Low
	Mg9		Low	Slightly	Low

		nearby watercourse.			
Route WB					
WB007 and new access track	M23b	Moderate- Situated on small area of exposed bedrock.	Low	Negligible	Low
WB010 and new access track	M23b	Low – situated on small area of exposed bedrock but likely supported by nearby watercourse.	Low	Negligible	Negligible
	W7 (Poor)		Low	Negligible	Negligible
WB016, WB017 and new access track	W7b	Low – situated on small area of exposed bedrock but likely supported by nearby watercourse.	Moderate	Negligible	Negligible
WB028 and CB012	W7 (Poor)	High- Situated near a spring. Likely to also be supported by the nearby watercourse.	Low	Negligible	Negligible
	M23b		Low	Negligible	Negligible
	M6c		Moderate	Negligible	Negligible
WB030 and new access track	M6	Low – situated on small area of exposed bedrock but likely supported by	Moderate	Slightly	Low
	M23b		Low	Slightly	Low
	W7c		Moderate	Slightly	Low
	M25a		Low	Slightly	Low

		nearby watercourse.			
WB030, CB015 and new access track	M15	Moderate- Situated on small area of exposed bedrock.	Moderate	Slightly	Low
WB032	M6	Moderate- Situated on small area of exposed bedrock.	Moderate	Negligible	Negligible
	M15		Moderate	Negligible	Negligible
	M7 (Poor)		Moderate	Negligible	Negligible
WB036 and WB037	M23b	Moderate- Situated on small area of exposed bedrock.	Low	Negligible	Negligible
WB038	M15b	Moderate- Situated on small area of exposed bedrock.	Moderate	Negligible	Negligible
WB039, WB040, WB041	M15d	Low – situated on small area of exposed bedrock but likely supported by nearby watercourse.	Moderate	Negligible	Negligible
	M23B		Low	Negligible	Negligible
WB045	M25	Low – situated on small area of exposed bedrock but likely supported by nearby watercourse.	Low	Slightly	Low
	W7		Moderate	Slightly	Low

WB053, WB052	W1	Low – situated on small area of exposed bedrock.	Moderate	Negligible	Negligible
	W7		Moderate	Negligible	Negligible
AA route					
CB033, AA005	W7c	Moderate-Situated on sediment deposits of unknown composition.	Low	Slightly	Low
	W4		Moderate	Slightly	Low
	M23		Low	Slightly	Low
	M25		Low	Slightly	Low

*Potential GWDTEs which overly bedrock were identified within the buffer zones for the ZG line and Denny North Substation. However, the majority of the potential GWDTEs were underlain by till, and the relative size of the potential GWDTE in comparison to the area underlain by permeable bedrock suggests that there NVC communities are not supported by groundwater. Therefore, these have not been assessed.

1.3 Summary and Conclusions

In summary, no significant impacts are anticipated to GWDTEs throughout the Project assuming that standard, embedded and additional mitigation measures are followed as laid out within Volume 1, Chapter 9 Water Environment.