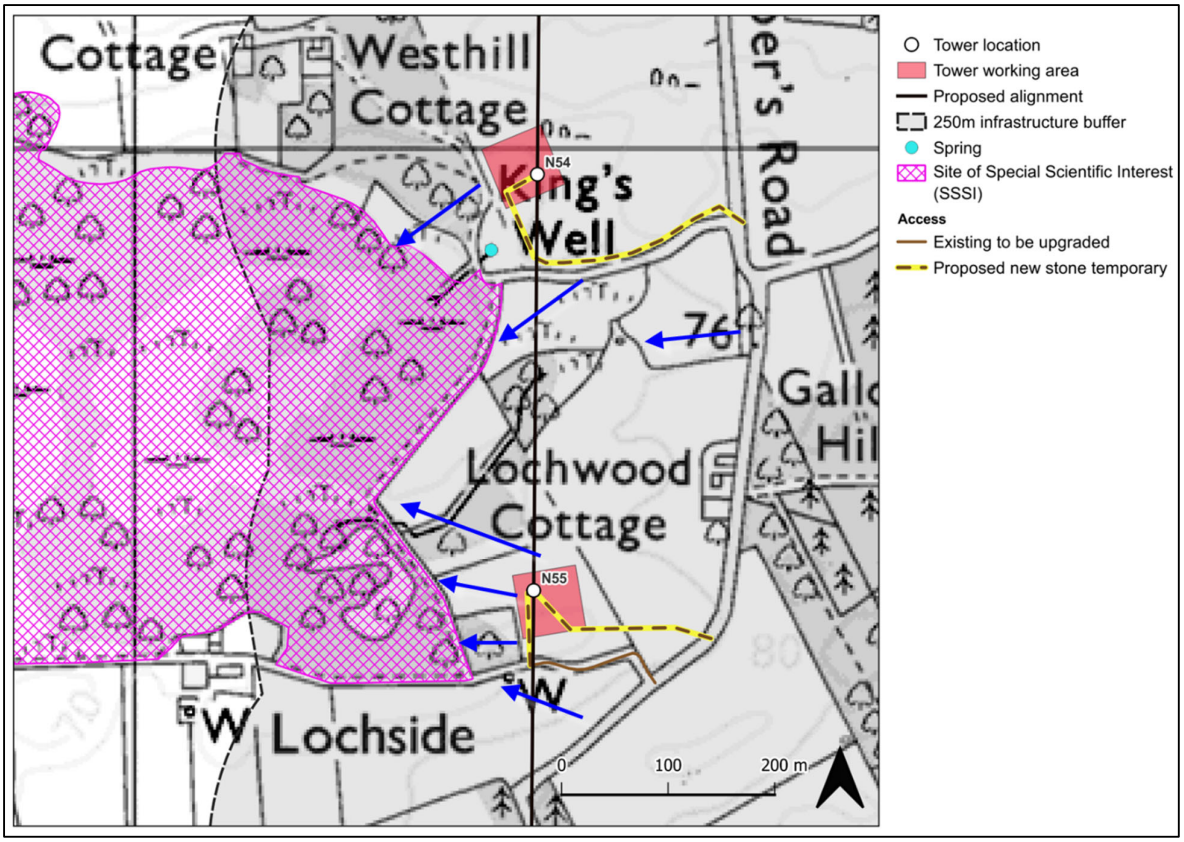
Photo 13.5.8: King's Well, no flow observed upwelling during survey

Plate 13.5.9: Loch of Park and associated nearby infrastructure



4.1.4 BGS 1:50K superficial geology maps indicate that the superficial drift geology at the GWDTE comprises Banchory Till Formation- Diamicton glacial deposits, peat, Lochton sand and gravel formation, lacustrine deposits (**Volume 3, Figure 13.5: Superficial Geology** in EIAR).

4.1.5 There is no peat indicated by the NatureScot Carbon and Peatland mapping (2016) at the GWDTE, but walkover surveys suggested there was likely to be some peat present within the Loch of Park basin.

4.1.6 Flow pathway analysis utilising LiDAR DTM topographic data indicates there are flow paths directly from the proposed infrastructure at tower N54 and N55, as well as from the proposed access track to the Loch of Park basin (**Plate 13.5.9: Loch of Park and associated nearby infrastructure**). Thus, without applied mitigation, groundwater quality may be impacted by run-off from construction activities. Towers N54 and N55 are located upslope of the Loch of Park basin at around 113 m AOD. There is therefore potential for excavation at the tower and access track to effect groundwater levels and subsequently effect the quantity of water at the spring at the King's Well. Given the low groundwater dependency here, the sensitivity of the receptor (the *potential* GWDTE) is considered to be **Low**. The spring/well and the proposed tower N54 are at a similar elevation, the well at around 72 m AOD and tower N54 around 73 m AOD, meaning that any excavations at the tower or at the temporary access track could potentially impact groundwater levels at the well. Based on topography and flow pathway analysis, surface water runoff from the access track and tower could flow towards the well. There are two proposed Crossing Scaffold areas upslope of the Loch of Park, with one upslope of the Kings Well. However, scaffolding does not require any excavation (it is temporarily required during construction for OHL crossings of roads or rivers) and is not considered to have any effect on the groundwater quality or quantity. With applied mitigation, the magnitude of change on the Loch of Park is considered to be **Low**, resulting in effect of **Minor** significance (Not Significant).

4.1.7 Additional mitigation measures will be put in place during construction to maintain the baseline subsurface flows towards the Loch of Park and ensure that any proposed infrastructure and associated drainage does not alter the natural drainage conditions of the site and/or have any negative effects on ground/surface water quality/quantity. The following specific additional mitigation measures will be utilised;

- Access tracks will be designed with suitable drainage to enable subsurface flows to be maintained and avoid constricting sub-surface flows and groundwater recharge;
- Additional SuDS and silt fences will be utilised on the west and south side of towers N54, N55 and the proposed access tracks to both towers, in order to eliminate the risk of sediment laden run-off flowing towards the Loch of Park; and
- Specific measures will be implemented on a case-by-case basis as directed by the ECoW during construction.

4.1.8 There is not expected to be any long-term effect on hydrology and sub-surface flows during operation.

4.1.9 With additional mitigation, the magnitude of change is considered to be **Negligible** and the significance of the residual effects on the Loch of Park are **Negligible** (Not Significant).

5. SUMMARY AND CONCLUSIONS

5.1.1 This appendix details the assessment undertaken to identify GWDTE that may be impacted by the infrastructure of the Proposed Development.

5.1.2 SEPA (2024) guidance on assessing the effects of developments on GWDTE states that the relevant buffer zones for GWDTE for all proposed infrastructure are:

- 10 m for all activities;
- 100 m radius of all subsurface activities less than 1 m in depth; and
- 250 m of all subsurface activities deeper than 1 m.

5.1.3 During design development the embedded mitigation was to avoid GWDTEs and buffer appropriately, where possible. Given the length of the Proposed Development and the rural setting, it was not possible to meet the recommended infrastructure buffers in all cases. This assessment provides a detailed assessment of GWDTEs that are within 250 m of the Proposed Development There are eight GWDTEs where infrastructure is proposed within the recommended buffers. Based on the GWDTE Decision Tool (**Table 13.5.1: GWDTE Decision Tool**) and site survey by hydrologists, they have been assessed to have either a **Moderate** or **High** dependence on groundwater. The ecological importance of each GWDTE was assessed during ecology surveys and the sensitivity of the GWDTE defined based on a combination of groundwater dependency and ecological importance at each site-specific location (see discussion in **Section 3: Effects Assessment**).

5.1.4 The effects of the Proposed Development on each GWDTE (assuming applied mitigation measures, such as construction SuDS, are in place) are summarised in **Table 13.5.4: Summary of Effects and Additional Mitigation**. Additional mitigation measures at each location are summarised, along with a determination of significance following the application of any proposed additional mitigation.

Table 13.5.4: Summary of Effects and Additional Mitigation

GWDTE	Sensitivity of GWDTE	Distance from infrastructure	Significance of Effect before Additional Mitigation	Additional Mitigation	Significance after Additional Mitigation
Section B					
GWDTE 1	Medium	GWDTE 1 is 17 m east of tower S153. Working area of tower S153 and access track is adjacent to the west edge of the polygon. GWDTE 1 is also ~230 m southwest of tower S152 working area.	**Moderate**	Access track will be designed to enable subsurface flows to be maintained. Additional silt fences, silt traps and SuDS will be emplaced and utilised during construction on the east side of the tower and along the east side of the proposed access track. Pre- and post-construction monitoring.	Minor
Section D					
GWDTE 2	Low	GWDTE 2 is 70 m northeast of tower S47 working area, 70 m west of tower S48 working area and 40 m north of access track to tower S47 and S48	Minor	None	Minor
GWDTE 3	Low	GWDTE 3 is 60 m southeast of tower S29 working area	Negligible	None	Negligible

GWDTE	Sensitivity of GWDTE	Distance from infrastructure	Significance of Effect before Additional Mitigation	Additional Mitigation	Significance after Additional Mitigation
GWDTE 4	Low	GWDTE 4 is 150 m east of tower S29 working area	Negligible	None	Negligible
GWDTE 5	Low	GWDTE 5 is 40 m northwest of tower S20 working area and 20 m northwest of proposed access track to tower S20. The GWDTE is upgradient and 160 m west of S19.	Minor	Pre- and post-construction monitoring. Engineering mitigation if groundwater table is high.	Negligible to Minor
Section F					
GWDTE 6	Low	GWDTE 6 located 10 m northwest of tower N50 working area, and 10 m northwest of access track. Also 190 m south of tower N49 working area.	Minor	Access track will be designed to enable subsurface flows to be maintained. Additional SuDS, silt traps/fences will be utilised at the north side of the tower N50 working area and north/west (downslope) side of the access track.	Negligible to Minor
GWDTE 7	Low	GWDTE 7 polygon is encroached by tower and working area of tower N13, as well as by proposed access. GWDTE is also 200 m northeast of N14.	Minor	Access track will be designed to enable subsurface flows to be maintained. Additional SuDS, silt traps/fences on towers and access tracks south/east sides.	Minor
GWDTE 8	Medium	1 m south of tower N6 working area. <1 m south of proposed access track to tower N6 and existing access track is within the GWDTE polygon.	**Moderate**	Access track will be designed to enable subsurface flows to be maintained. Additional SuDS, silt traps/fences on towers and access tracks. Pre- and post-construction monitoring. Engineering mitigation if groundwater table is high.	Minor
Loch of Park	Low	Loch of Park is located 100 m southwest of tower N54 and 40 m west of tower N55, access track infrastructure is 15-40 m west of the Loch of Park	Minor	Access track will be designed to enable subsurface flows to be maintained. Additional SuDS, silt traps/fences on towers and access tracks west sides.	Negligible

5.1.5 Additional mitigation measures will be put in place during construction to maintain the baseline subsurface flows towards the GWDTEs and ensure that any proposed drainage does not alter the natural drainage conditions of the site. Mitigation measures primarily aim to ensure that the water supply to a GWDTE is not interrupted and that any proposed drainage does not alter the natural drainage conditions of the site. Specific measures will be implemented on a case-by-case basis, as directed by the ECoW during construction.

5.1.6 Monitoring at GWDTEs 1, 5 and 8 will be carried out to assess the quantitative and chemical effects of the infrastructure to ensure that the groundwater flow and quality are not significantly changed, which would put the sensitive receptors at risk. Monitoring will be carried out before, during and after construction and will follow SEPA guidance; this will include the installation and sampling of several groundwater monitoring wells. Details of the

proposed monitoring programme will be set out in the Construction Environmental Management Plan (CEMP) that will be agreed with SEPA, Angus Council and Aberdeenshire Council in advance of the works.

5.1.7 With additional mitigation in place, the residual effects on the GWDTEs are assessed to be of **Minor** to **Negligible** significance (Not Significant).

ANNEX 13.5.1: KINTORE TO TEALING 400 KV OVERHEAD LINE (OHL) PROJECT – LOCH OF PARK SITE VISIT – FILE NOTE

File Note

Kintore to Tealing 400 kV Overhead Line (OHL) Project – Loch of Park Site Visit

Sender	Recipient(s)
LUC	SSEN Transmission
Kaya Consulting	NatureScot
Project Number	**Date/Time**
12257	18 November 2024 (updated 11 March 2024 to the SEPA (2024) guidance)

Site Visit

[redacted] (Associate Ecologist, LUC) and [redacted] (Hydrologist, Kaya Consulting) undertook a joint site visit to Loch of Park SSSI on 12th September 2024. The site visit aimed to assess the groundwater dependency of the plant communities within the SSSI, and to confirm whether Groundwater Dependent Terrestrial Ecosystems (GWDTE) were present.

The eastern side of the SSSI and adjacent habitats, between approximately Lochside in the south and Westhill Cottage in the north, was surveyed where ground conditions allowed safe access. The plant communities were assessed against the National Vegetation Classification (NVC)[1], which included referring to previous survey information[2] provided by NatureScot. Assessment was made of the hydrogeology of the area, including checking for signs of upwelling and undertaking water chemistry analysis at several locations.

NVC Plant Communities

Loch of Park SSSI

W2 *Salix cinerea - Betula pubescens - Phragmites australis* woodland

The woodland within the east of the SSSI is largely dominated by alder (*Alnus glutinosa*) and grey willow (*Salix cinerea*) with a swampy field layer. The taller alder trees exhibited increasing dominance on relatively more stable ground, while the grey willow carr dominated in the most swampy conditions. Downy birch (*Betula pubescens*) and rowan (*Sorbus aucuparia*) were noted occasionally towards the drier outer edges of the woodland.

The vegetation does not exhibit a close fit to published NVC communities[1], as common reed (*Phragmites australis*) is absent from the swampy field layer which is instead dominated by reed sweet grass (*Glyceria maxima*). Additional species recorded in

[1] Rodwell, J.S. (ed.) (1991-2000) British Plant Communities, Volumes 1-5. Cambridge University Press, Cambridge.
[2] Milne, F. (2004) Loch of Park NVC Vegetation Survey. A report by Central Environmental Surveys.

the field layer at varying frequencies include tufted hair grass (*Deschampsia cespitosa*), creeping bent grass (*Agrostis stolonifera*), marsh bedstraw (*Galium palustre*), common nettle (*Urtica dioica*), water mint (*Mentha aquatica*), lady's fern (*Athyrium filix-femina*), water forget me not (*Myosotis scorpioides*), creeping buttercup (*Ranunculus repens*), and cuckooflower (*Cardamine pratensis*).

Efforts were made to access as much of the woodland as possible from various directions. However, the ground was noticeably unstable and so great care was taken. In several locations, it was apparent that it would not be possible to safely proceed any further, as areas of reasonably stable ground would very abruptly transition into ground that was entirely unstable and unsafe.

Previous detailed survey of the wider SSSI concluded that this form of woodland is a type of W2 *Salix cinerea - Betula pubescens - Phragmites australis* woodland, which is ordinarily considered to be a southern community, although Milne[2] suggests that this is an artefact of limited sampling in the north. The previous survey was undertaken by an experienced botanist, who conducted an extensive survey across the wider site, which included collection of quadrat samples; as such, no change is suggested to be made to the previous classification.

W2 has Moderate potential to be groundwater dependent[3].

W6 *Alnus glutinosa - Urtica dioica* woodland

Limited extents of relatively drier woodland were recorded within the south-east of the SSSI alongside a track. The canopy was dominated by alder with lesser extents of grey willow and downy birch. The field layer was dominated by a grassy assemblage of tufted hair grass and Yorkshire fog (*Holcus lanatus*), with soft rush (*Juncus effusus*), and ferns including male fern (*Dryopteris filix-mas*) and broad buckler fern (*Dryopteris dilatata*). Bramble (*Rubus fruticosus*), bracken (*Pteridium aquilinum*) and common nettle were recorded occasionally. Similar woodland, with a canopy that was variously dominated by either alder or grey willow, was noted to the east of the track outwith the SSSI.

This woodland has been assessed to be W6 *Alnus glutinosa - Urtica dioica* woodland, which has Moderate potential to be groundwater dependent[3].

W17 *Quercus petraea-Betula pubescens-Dicranum majus* woodland

The north-east corner of the SSSI comprises a slope that leads down from the driveway to Westhill Cottage into the topographic basin of the SSSI. The woodland on this slope is dominated by downy birch with occasional rowan and beech (*Fagus sylvatica*). The field layer was noted to be relatively sparse, with scattered bracken which thickens up in some places. Otherwise, the main components were wavy hair grass (*Avenella flexuosa*) and *Rhytidiadelphus triquetrus*, with wood sorrel (*Oxalis acetosella*). Closer towards Westhill Cottage within the SSSI, and on the north of the driveway outwith the SSSI, rhododendron (*Rhododendron ponticum*) has invaded the woodland, creating a dense shrub layer and suppressing all other vegetation.

The W17 community does not have potential to be groundwater dependent.

S5 *Glyceria maxima* swamp

At the base of the slope leading down from the driveway to Westhill Cottage, was a small area of open swamp dominated by reed sweet grass. Additional occasional species included marsh thistle (*Cirsium palustre*), creeping buttercup, tufted hair grass, and alder seedlings.

The S5 community has Low potential to be groundwater dependent[4].

Additional Observations Outwith the SSSI

The area immediately around the Kings Well, outwith the SSSI, comprises a wooded area of downy birch, beech, sycamore (*Acer pseudoplatanus*), rowan, lime (*Tilia x vulgaris*) and yew (*Taxus baccata*). The area around the well had been landscaped in the past with stone cobbles and a stone-lined channel; this suggests that the wooded area is also likely to have been greatly altered by formal planting in the past. There was no semi-natural shrub or field layer as rhododendron formed a dense thicket

[3] SEPA (2024).Guidance on Assessing the Impacts of Development Proposals on Groundwater Dependent Terrestrial Ecosystems, August 2024
[4] UKTAG (2008) Annex 1: NVC plant communities and dependency on groundwater.

under the trees, suppressing all other vegetation. As such, it was not possible to assign an NVC community, and there were no signs of any community that could be considered to be groundwater-dependent.

Habitats to the east of the track, outwith the SSSI, comprised a mosaic of stands of woodland (W6, see above) and grassland. The majority of the grassland was dominated by false oat grass (*Arrhenatherum elatius*), with lesser extents of creeping soft grass (*Holcus mollis*) and cocksfoot (*Dactylis glomerata*). Nettles and bracken were noted, the latter of which formed a dense stand along a drystone wall. As the grassland comprised MG1 *Arrhenatherum elatius* grassland, it was not investigated further as it does not have potential to be groundwater-dependent and was outwith the SSSI.

A narrow extent of vegetation dominated by soft rush and tufted hair grass was noted to form a strip between the MG1 grassland and a stand of W6 woodland, outwith the SSSI. Additional species noted included Yorkshire fog, creeping buttercup, common sorrel (*Rumex acetosa*) and wild angelica (*Angelica sylvestris*). This is assessed to be an example of M23 *Juncus effusus/acutiflorus - Galium palustre* rush-pasture, and specifically the M23b *Juncus effusus* sub-community. It is considered to have Moderate potential to be groundwater-dependent in SEPA guidance[3].

Photos of Plant Communities

W2 woodland in the south-east of the SSSI

W2 woodland in the north-east of the SSSI

W6 woodland in the south-east of the SSSI

W17 woodland in the north-east of the SSSI

W17 woodland with dense rhododendron in the north-east of the SSSI

S5 swamp in the north-east of the SSSI

Wooded area around the Kings Well outwith the SSSI

The Kings Well outwith the SSSI with dense rhododendron

MG1 grassland outwith the SSSI

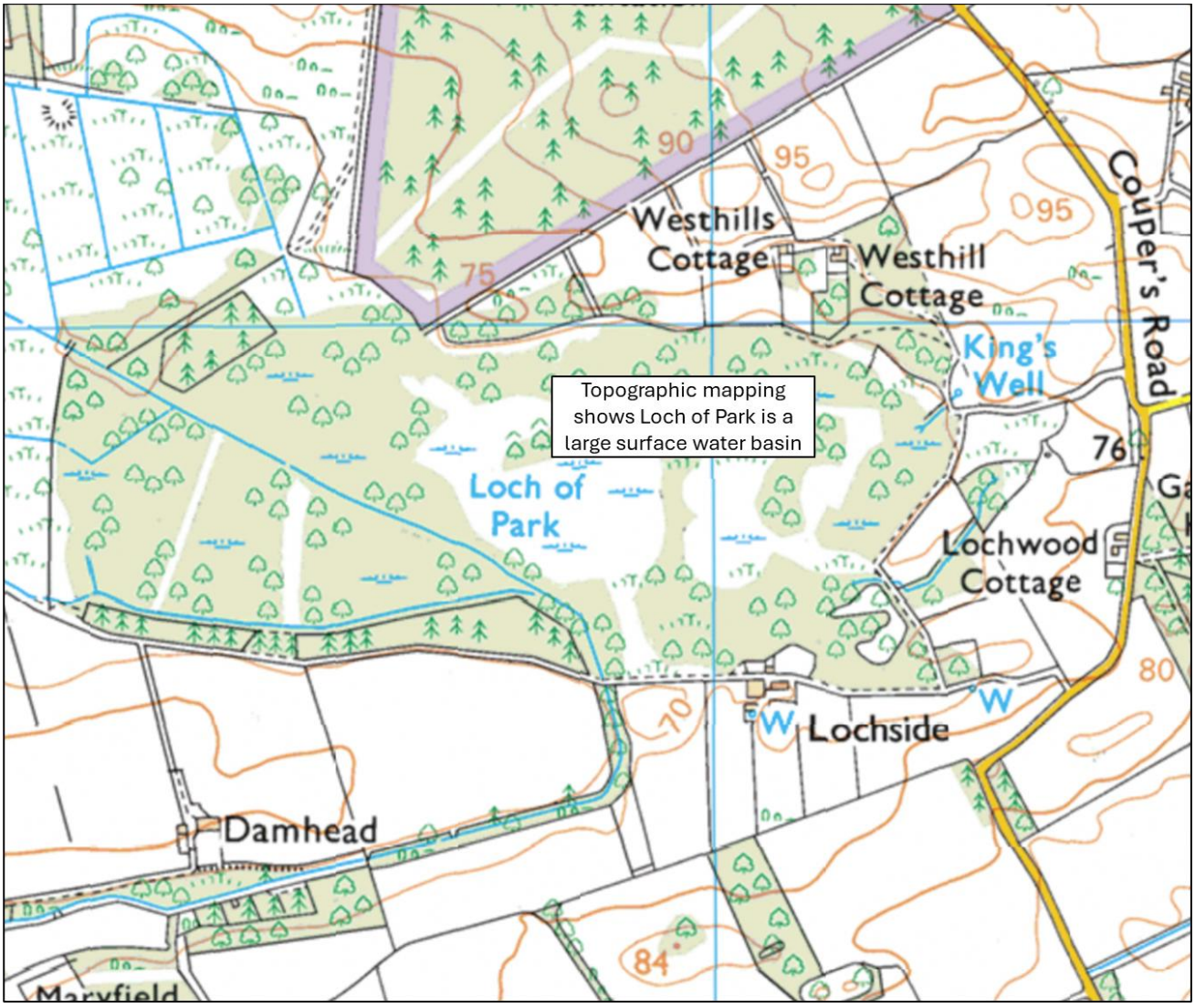
Narrow strip of M23b rush-pasture outwith the SSSI

Hydrogeological Assessment

Assessment of the hydrogeological status of the NVC plant communities concluded that the groundwater input is likely insignificant in comparison to the vast surface water input in this area. As such, the NVC habitats with indicative groundwater dependency described above are classified as having at most, low groundwater dependency and are not considered to be GWDTE. The hydrogeological assessment is provided below.

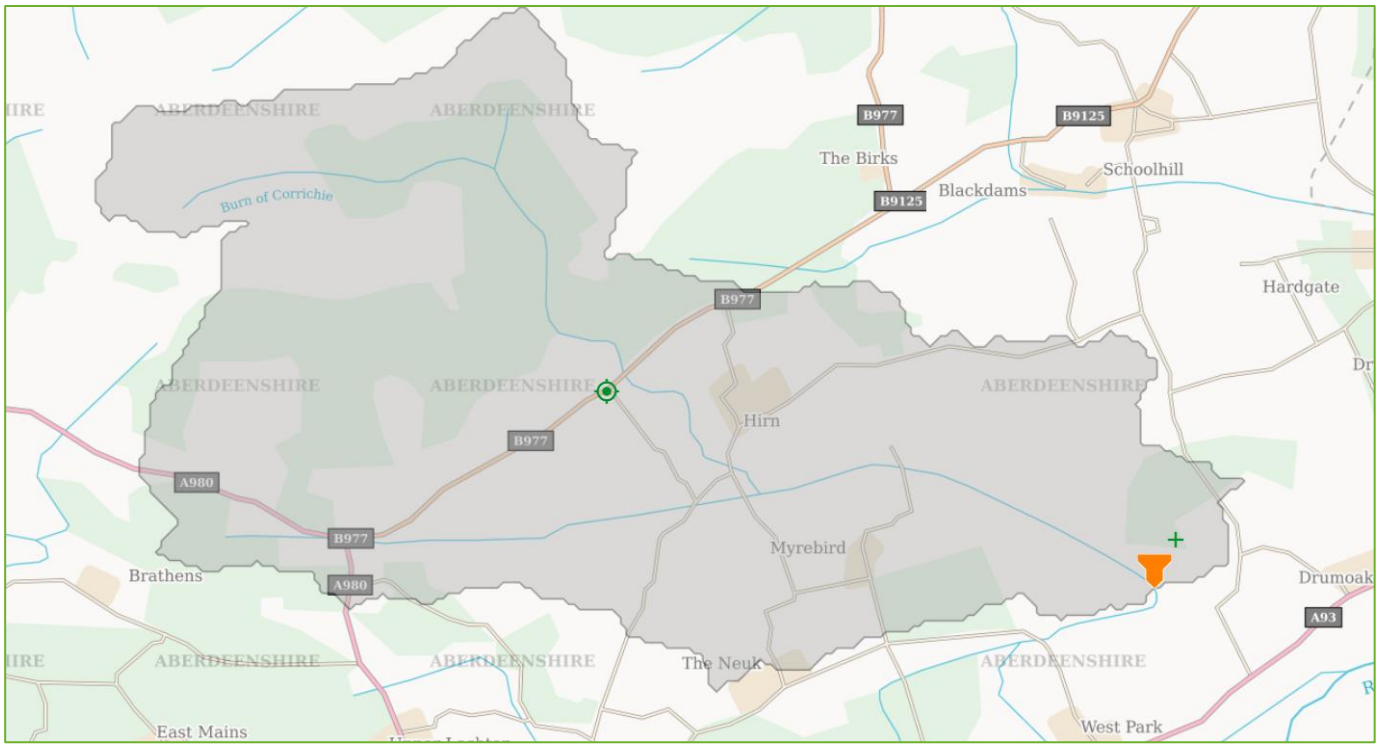
The topography of the Loch of Park and surrounds in shown in **Figure 1**, based on Ordnance Survey mapping. The Loch of Park is a low-lying topographic basin that sits just below the 70 m AOD (Above Ordnance Datum) contour. The Black Burn flows in a south-easterly direction through the Loch of Park (**Figure 1**). There are also a number of drains in the area, most of which are tributaries of the Black Burn. The catchment area of the Black Burn as it leaves the Loch of Park in the south is 34.6 km² (Flood Estimation Handbook Web Service[5]). The catchment area is shown in **Figure 2**.

Figure 1: Topographic and Hydrological Setting of the Loch of Park



[5] UK Centre for Ecology and Hydrology: Flood Estimation Handbook Web Service (https://fehweb.ceh.ac.uk/Map)

Figure 2: Catchment Area of the Black Burn at the downstream extent of the Loch of Park (source FEH web service)

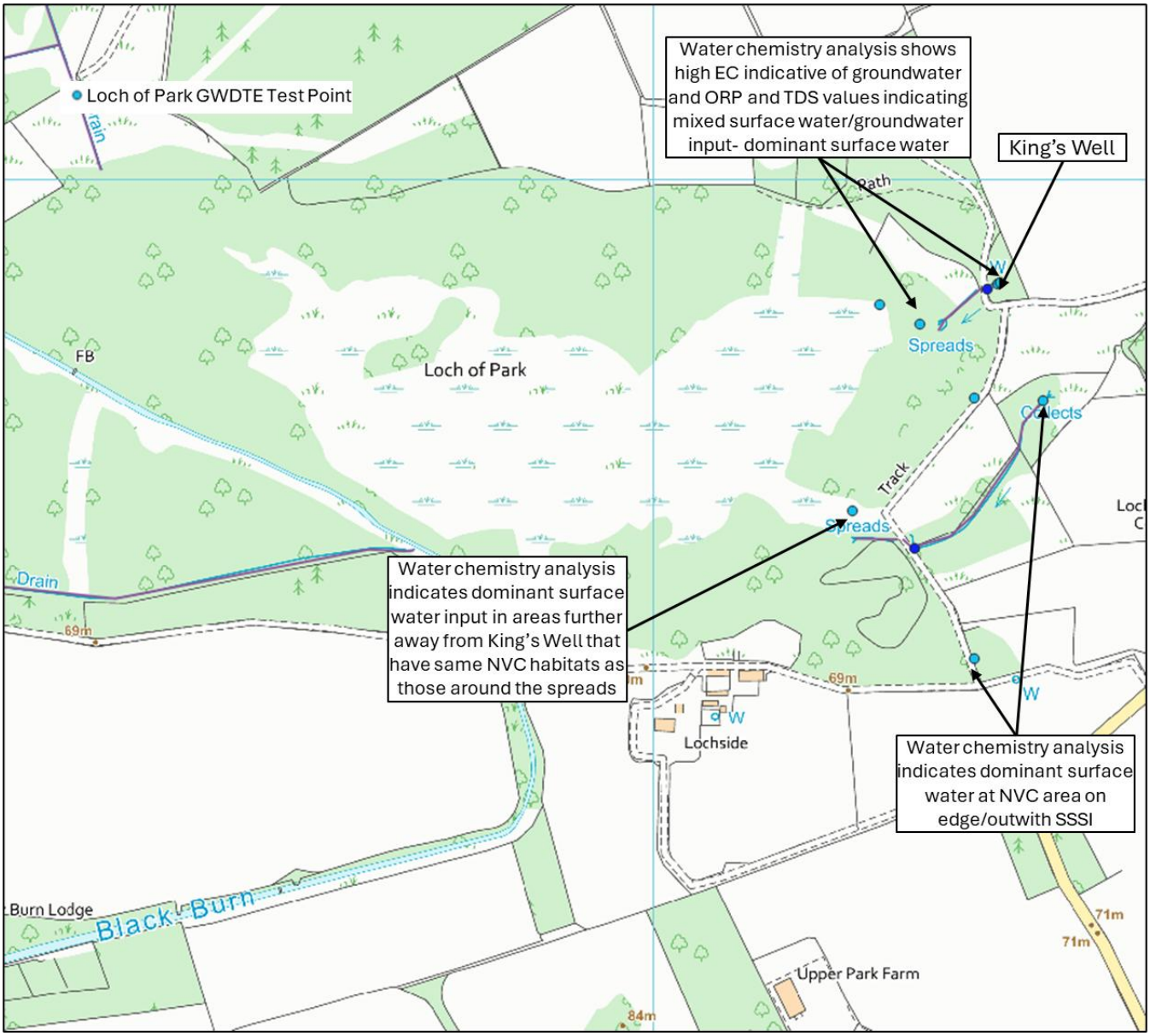


An overview of the geological and hydrological setting is provided in **Table 1.** There are several wells and a spring source in the vicinity of the Loch of Park and water chemistry testing was undertaken at key locations during the site visit. Locations of water chemistry analysis are shown in **Figure 3** and the results were used to aid the overall interpretation of groundwater dependency.

Table 1: Geological and hydrogeological setting of Loch of Park

Data source	Type
British Geological Survey (BGS) Bedrock Geology	Crathes Pluton- Granodiorite- Igneous Intrusive rocks
BGS Superficial Deposits	Peat, Lochton Sand and Gravel, and Hummock Glacial Deposits (diamicton, sand, gravel)
Bedrock Aquifer Productivity/Flow mechanisms	Low/Fracture Flow

Figure 3: Water chemistry sampling locations and summary of results in the Loch of Park area.



The King's Well is located on the eastern edge of the Loch of Park (**Figure 3**). To the east of the well (near the brick wall) there is a rare example of an intermittent spring upwelling within a granitic igneous body. There are no NVC habitats with potential groundwater dependency noted around this upwelling or the King's Well and the vegetation comprises of dense rhododendron bushes and other woodland species. No flow upwelling was observed at time of site visit but there was evidence of previous upwelling flows and local residents have also noted upwelling in this area, indicating an intermittent spring.

During flow periods of the spring, the spring water will continue to flow downslope, culverted beneath the road towards the 'spreads' and towards the NVC habitat noted by ecologists with potential groundwater dependency. This flow path was not actively occurring during the site visit, as the spring was not upwelling.

Most of the habitats noted to have potential groundwater dependency are located within the large topographic basin of the Loch of Park. This basin is a large topographic bowl where flooding has been reported regularly by local residents up to the 70 m

AOD contour. The SEPA 200-year plus climate change flood mapping interprets a similar, if slightly higher and wider floodplain here. As noted above, the Black Burn flows through Loch of Park and has a large surface water catchment which drains to the area (**Figure 2**). The Black Burn is no longer dredged contributing to even higher surface water retention in this area.

The survey area within the Loch of Park where NVC W2/W6 and S5 *Glyceria Maxima* swamp habitats are located is a significant surface water dominated environment, with a large surface water catchment. It should be noted S5 does not indicate potential groundwater dependency but is a surface water swamp habitat species. These areas are very boggy and typically underlain by peat, in places over 1 m deep. Peat systems are often ombrogenous (rainfall fed systems) lying over impermeable bedrock.

Water chemistry analysis was undertaken at several locations around the east area of the Loch of Park and the King's Well (see **Figure 3** for locations). The electrical conductivity (EC) values were indicative of groundwater at the King's Well and immediately downstream of this (generally over 200 µS). However, oxygen reduction potential values pointed to a significant surface water input in the Loch of Park area, as expected. Of crucial importance, at areas where groundwater testing was undertaken in the southeast of the Loch of Park, several hundred metres away from the King's Well the same W2/W6 and S5 *Glyceria Maxima* NVC habitat were observed and there was limited groundwater signal present in the water chemistry results (*i.e.*, EC values and total dissolved solids (TDS) values were lower and oxygen reduction potential were higher than that observed close to the King's Well spring area) indicating a surface water dominated environment.

The additional stands of W6 that were observed outwith the SSSI were also tested and water chemistry results here indicate a surface water dominated environment.

In summary, the groundwater input from the intermittent spring near the King's Well is considered to be highly localised and is considered insignificant in comparison to the vast surface water input in this area. Therefore, the NVC habitats that are noted to have potential groundwater dependency are classified as having at most, a low groundwater dependency and are not considered to be GWDTE.