DOD FARM WOODLAND CREATION

ASSESSMENT OF POTENTIAL IMPACT ON WATER YIELDS WITHIN DRINKING WATER PROTECTION AREAS

Context - Drinking Water Protection Areas

In their response to the initial consultative exercise on the proposed woodland creation at Dod Farm, Scottish Water (SW) confirmed that the site lies within a Drinking Water Protection Area (DWPA).

SW referred to Dod Farm as being within the '*Dod Burn Intakes catchment*'. This catchment is connected to the Roberton Water Treatment Works (WTW), which SW noted as '*currently operating in deficit*'.

The Dod Burn flows through the centre of Dod Farm. It is understood that some of the Dod Burn's flow is fed into an intake on the Burn about 400 m north of the Dod Farm site, and piped to Acreknowe Reservoir. Water not directed to Acreknowe Reservoir continues to flow down the Dod Burn before joining the Allan Water. Acreknowe Reservoir is used as a contingency feed for the Roberton WTW, notably when water levels in Alemoor Reservoir, the main supply for Roberton WTW, are low.

Although the exact nature of the supply network has not been made available by Scottish Water, the catchment map they supplied suggest that Acreknowe Reservoir is also fed from water taken from the Priesthaugh Burn and the Skelfhill Burn, as well as from the Reservoir's natural catchment.

Map 1 shows the location and extents of the above catchments.

SW have not provided Information on the circumstances, timing, and volumes of water taken from the Dod Burn to feed Acreknowe Reservoir, nor has information on the yields and demands for Roberton WTW as a whole (there is no publicly available source that suggest that the Roberton WTW is in deficit). Further, SW confirmed that the only publicly available source of catchment location information, on the Scottish Government website, is inaccurate.

Given the above isn't possible to have an absolute understanding of the Dod Burn catchment's place in the bigger picture. Therefore this impact assessment should be viewed as being partial, and a conservative approach has been taken.

Scottish Water's Impact Assessment

In their consultation response, Scottish Water confirmed that broadleaved planting will have negligible impact on water yield, while they stated that the proposed coniferous planting at Dod Farm (based on their interpretation of the 'concepts' map supplied) would cover 16% of the Dod Burn catchment Area, and would have a negative impact on yield, '*decreasing the yield by 0.086 Ml/d*.'

From a response to a follow-up question It is understood that the SW's impact assessment on yield was based on the assumption that a mature coniferous woodland in an upland situation reduces water yield by 15-20%, which is the commonly cited figure within the forestry industry. Whether the volume loss was on the total yield, or on the amount flowing to Acreknowe Reservoir wasn't stated. Given that no reference was made to what the total yield for the Dod Burn intake catchment, for the Acreknowe Reservoir catchment, or for the Roberton WTW was given, it is not possible to gauge the significance of this estimated impact using Ml/d data, which is crucial in terms of assessing impacts.

This impact on yield was said by SW to make Dod Farm Woodland Creation '*a medium risk development*', and SW requested that the plan should be revised and sent back for their review.

SW's response to a follow-up question on impacts on yields noted that '*the water yield from a forest needs to be considered so that low water flow is avoided. A forest can affect water flow if it has a high water use, which in turn could result in a low water yield*'. Given that Acreknowe Reservoir acts as a

contingency supply for Roberton WTW during low flow periods, this issue is clearly of importance. However, it is accepted that tree rooting improves soils structure, which has the effect on increasing soil infiltration (when compared to agricultural land uses) and this aids recharge of groundwater to sustain low flows during droughts. The 'Forests and Water' Guidelines notes that '*Research suggest that the reduction in water yield due to upland conifer forests has a relatively small effect'* on summer base flows.

SW were also asked what level of impact on water yield would be considered low risk - in essence this was intended to find out what extent of coniferous planting would be deemed acceptable to SW. In response, SW stated that this was at the discretion of the hydrologist responsible for the area, and that there may not be a 'low risk' approach when planting conifers.

Impact Assessment

In the absence of full information on a number of aspects, including the interrelationships between catchments and usage, it isn't possible to undertake a detailed analysis of the impact of the Dod Farm woodland creation proposal.

However, a simple exercise has been undertaken to give an indication of the significance of the proposed planting at Dod Burn in relation to:-

- The Dod Burn intake catchment
- The combined Acreknowe Reservoir catchment (incorporating the Dod Burn, Priesthaugh, Skelfhill, and Acreknowe 'topographic' catchments).
- The Alemoor catchment.

In addition to considering the total size of the catchments, the assessment has involved looking at the existing extent of coniferous woodland within the above-mentioned DWPA's. Data for this has used the National Forestry Inventory (NFI) and aerial imagery, together with information gleaned on the single substantial recent coniferous planting scheme undertaken within the catchments. From examination it appears that the only recent coniferous planting of scale, at Acreknowe Forest, has been included in the NFI, Acreknowe Forest, which is not yet recorded on the NFI. There are major forests in the Alemoor catchment, including a part of Craik Forest, and Wester Alemoor Forest, while Priesthaugh Forest occupies large parts of the Priesthaugh Burnand Dod Burns catchments.

It should be noted that the NFI takes a broad brush to definitions of woodland type, and in addition to the 'conifer' category, other categories included in this assessment as being coniferous woodland includes all areas of young trees, felled trees, windblow and ground prepared for planting. This ensures that a conservative approach is taken in this impact assessment.

In recognition that there may be changes occurring in terms of the existing woodland types, the long-term forest plan for Priesthaugh was examined. It appears that there will be only a minor decline in the extent of coniferous cover in the next 20 years, and that the subsequent increase in water yield would be limited. The Land Management Plan for Craik Forest (including the area within Alemoor Reservoir's catchment) also suggests a minor reduction in the extent of coniferous woodland, while maps covering Wester Alemoor and Hyndhope Forests (in the norther parts of the Alemoor DWPA) also indicate a small decreases in coniferous cover are underway. Given the cumulatively large scale of these forest, collectively it is estimated that the decrease in planned coniferous cover will be substantially greater than the increase proposed at Dod Farm, but a significant amount of work would be required to fully evidence this.

Scottish Forestry confirmed that aside from Acreknowe Forest, there have been no other significant woodland creation schemes in the identified DWPA's, nor are they aware of other schemes at the planning stage.

In 2025, SW informed Forestry and Land Scotland that none of their land was within a DWPA, and similarly and previously informed the applicant for Acreknowe that none of their land was within a DWPA, when in fact there are substantial areas in both properties within DWPA's. Understandably, the potential impacts of forestry was not raised as an issue in the Land Management Plan or the woodland creation application.

Table 1 sets out the size of the aforementioned catchments and the extent of coniferous woodland cover within them, together with an estimate of their overall contribution to these areas.

Table 1 - Existing Coniferous Woodland Cover within DWPA's.

Catchment	Catchment size (ha)	Proportion of Overall Catchment	Area of Coniferous Woodland (ha)	% Catchment under Conifer Woodland
Dod Burn (intake)	499	11.7%	253	50.7%
Priesthaugh	659	15.4%	316	48.0%
Skelfhill	511	12.0%	0	0.0%
Acreknowe	245	5.7%	36	14.7%
Acreknowe Reservoir (combined)	1,914	44.8%	605	31.6%
Alemoor Reservoir	2,356	55.2%	1414	60.0%
Roberton WTW	**4,270**		**2019**	**47.3%**

Map 1 provides a rough picture of the extent of coniferous woodland within the various catchments.

In summary, the figures show that 50.7% of the Dod Burn intake catchment is under coniferous woodland, with 31.6% of the combined Acreknowe Reservoir catchment being under coniferous woodland, and with the overall figure for the Roberton WTW being 47.3%.

Table 2 below sets out information on the extent of coniferous woodland, and percentage of DWPA's under coniferous woodland including the Dod Farm proposals. This proposals include for 61 ha of coniferous woodland creation.

Table 2 - Coniferous Woodland Cover within DWPA's including Dod Farm.

Catchment	Catchment size (ha)	Total Existing Woodland (ha)	% catchment exist. conifer woodland %	Dod Farm Proposal (ha)	% catchment cover %	Updated Total woodland ha	% Catchment under Conifer Woodland %
Dod Burn	499	253	50.7%	61	12.2%	314	**62.9%**
Priesthaugh	659	316	48.0%	0	0.0%	316	**48.0%**
Skelfhill	511	0	0.0%	0	0.0%	0	**0.0%**
Acreknowe	245	36	14.7%	0	0.0%	36	**14.7%**
Acreknowe Reservoir (combined)	1914	605	31.6%	61	3.2%	666	**34.8%**
Alemoor Reservoir	2356	1414	60.0%	0	0.0%	1414	**60.0%**
Roberton WTW	**4270**	**2019**	**47.3%**	**61**	**1.4%**	**2080**	**48.7%**

In summary, the inclusion of Dod Farms coniferous planting will result in coniferous cover within Dod Burn intake catchment rising to 62.9%, while the figure for the Acreknowe Reservoir catchment will rise to 34.8%, and figure for the Roberton WTW catchment will increase to 48.7%. These are rises of 24%, 10.1%, and 2.9% respectively. As noted above, these calculations exclude the planned decreases in coniferous woodland cover within the existing large forested areas.

Impact on Yield

By using the '20% impact on yield' guide for coniferous woodland it is possible to calculate the approximate extent to which the proposals will impact water yield over the various catchments. Table 3 below sets out the impact assessment for the additional impact of Dod Farm's proposal.

The growth stage that coniferous woodlands are at has an impact on water use; fast growing conifers near or at economic maturity have a greater impact than that of a) recently planted conifers, b) coniferous trees which have passed economic maturity and c) slower growing conifers. Currently, the forest at Priesthaugh and parts of the forest around Alemoor are weighted towards trees at economic maturity. As forest cover overall in the catchments moves towards a 'normal' age class distribution, overall impacts on water yield will decline before evening out.

In this simple impact assessment these factors has been ignored, as have the planned minor reductions in coniferous woodland cover within the large forest units around Alemoor and at Priesthaugh, and the 'worst-case' scenario, of all the coniferous areas having the maximum impact, has been assumed.

Table 3 – Impact on Yield

Catchment	Increase in woodland (ha)	Increase in woodland (%)	Reduction in yield (%)
Dod Burn	61	12.22%	2.44%
Priesthaugh	0	0.00%	0.0%
Skelfhill	0	0.00%	0.0%
Acreknowe	0	0.00%	0.0%
Acreknowe Reservoir (combined)	61	3.19%	0.64%
Alemoor Reservoir	0	0.00%	0.0%
Roberton WTW	**61**	**1.43%**	**0.29%**

In summary, following the above assessment, the proposals for Dod Burn will decrease water yield in the Dod Burn intake catchment by 2.44%, by 0.64% in the Acreknowe Reservoir catchment, and by 0.29% in the Roberton WTW catchment.

In order to sense check the above, two other calculations have been made, albeit based on partial information.

Scottish Water estimated that the coniferous woodland cover at Dod Farm (based on their examination of a scoping map) extended to 16% of the Dod Burn Intake catchment. Based on our measurements, which give a catchment area of 499 ha, and a coniferous area of 61 ha, coniferous woodland cover extends to 12.2% of the catchment. Scottish Water then estimated that the coniferous woodland would result in a decrease in yield of 0.085Ml/d. Given that this figure was based on 16% of the catchment being under coniferous woodland, the loss if 12.2% of the catchment was under coniferous woodland would be 0.065Ml/d. It is understood that the capacity of the Roberton WTW is 16.2Ml/d. : the loss of 0.065Ml/d amounts to 0.40% of the capacity.

On the basis that the figures above are based on a 'worst-case' scenario, setting aside the unknowns in catchment sizes and relationships, and ignoring mitigating factors relating to the age-class structure of the woodlands and planned reductions in the extent of coniferous woodland cover in the major forest units, the forecast decrease in water yield resulting from the Dod Farm proposal is thought to be insignificant.