An Coimisiún Pleanála

Specialist Report

R314763_AppX

Development	**Enniskerry mixed use Development Reference 314763-22.**
Type of Application	**Normal Planning appeal.**
Topic	**Assessment regarding (i) the Hydrological and Hydrogeological Assessment Report and the potential impact on Knocksink Wood SAC (00725). (ii) the adequacy of the WFD Assessment and a review of the assessments submitted by the appellants regarding the potential impacts of the development.**
Senior Planning Inspector	**Ian Boyle.**
Date	**16th December 2025**

Development Overview & Introduction:

The proposed development is for a new mixed-use development proposal, split over two planning applications – both of which have been appealed.

Part 1 (ABP Ref. ABP-314763) mainly comprises the rear (northern) and western sections of the subject lands. It accounts for roughly 24% of the overall proposed residential units.
Part 2 (ABP Ref. ABP-314765) mainly comprises the front (southern) and central sections of the site. It accounts for roughly 76% of the overall proposed residential units.
The overall proposed scheme (Parts 1 and 2) accounts for a total of 129 no. residential units as well as enterprise and employment, community, and childcare uses, and ancillary works.

The subject site is located on the western edge of Enniskerry, c.1km from the centre of the village in a greenfield site. The subject site is located within the townland of Parknasilloge.

Given the technical and complex nature of the hydrogeology of the site and the positions put forward by both applicant and third parties the assistance and input of the in-house Environment team was requested to assist in the assessment of the hydrogeological aspects of the both the applicant and the third parties.

Topographical setting:

The site is located within a narrow steep sided wooded valley in the Northeast Wicklow Mountains. Topographically the site falls towards the Glencullen river in a steep descent dropping from approximately 165m ITM to 135m ITM over c.600 metres. To the east of the site the topography falls steeply to the river dropping c. 50 metres over a relatively short distance of 250 metres. The Glencullen river is the only surface water feature near the site which runs from West to East a short distance north of the site and through the village of Enniskerry to the east of the subject site.

Hydrological and hydrogeological setting:

The mapped bedrock across the subject site is described as Maulin formation which is described as a dark blue grey slate schist. There are a number of faults within the bedrock of the area. One fault line running NW to SE to the east diagonally through the site. To the north

east of this fault line the Glencullen river is located where the bedrock here is the Glencullen River Formation which is described as a Buff-coloured tuff and greywacke. There is also a fault line that runs west to east and runs underneath the Glencullen river.

Subsoils across the site are described as gravels derived from limestones. This extends towards the river where the subsoil changes to bedrock outcrop and subcrop nestled in around the alluvial material associated with the river.

The effective rainfall at the subject site is 652.9mm/year with 85% of this recharging the underlying aquifer. Groundwater recharge is indicated consistently across the site. This is in line with the high vulnerability rating associated with the deposits of sands and gravels overlain by a well-drained soil component. As expected, across the site the vulnerability rating is mapped as high with high subsoil permeability which essentially means that a minimum of >2m soil thickness exists between the surface and the groundwater/bedrock.

The GSI description of the groundwater body gives an excellent description of the layout of the GW body. In this groundwater body the elevations rise from the east from between 50 to 100m OD to c.200m OD in the west with deposits covering many valleys in the area. The extent of the body is defined by the presence of gravel deposits in excess of 10m thickness. The only exception to this being on the Northern Boundary of the waterbody along the Wicklow and Dublin County boundary. The GWB is composed of permeable sand and gravel deposits, with a high storativity. As referenced above recharge occurs diffusely through the overlying topsoil. The aquifer is generally unconfined but may be locally confined where lower permeability deposits overlie the gravels. The water table within gravel aquifers is usually flat and therefore the depth to water will depend on the topography of the area. The flow paths within the aquifer are constrained by the extent of the deposit. Groundwater discharge will occur via springs and seeps along the lowest boundary of the body and also along river courses. There may also be discharge to rivers as baseflow where the water table lies above the river stage. There are some groundwater dependent ecosystems overlying the aquifer. The aquifers beneath the site are rather complex in arrangement and can be best described as follows. The bedrock aquifer located at the site is a Locally important aquifer with bedrock which is moderately productive only in local zones. Overlying this is a sand and gravel aquifer which is regionally important gravel aquifer extending over an area of 10.08km^2.

In an effort to differentiate between the two aquifer types under the site I will give a brief description of both.

Locally Important Bedrock Aquifer (Ll), Moderately Productive only in Local Zones:
This kind of aquifer has a limited and relatively poorly connected network of fractures, fissures and joints, with resultant low fissure permeability which generally decreases with depth. A shallow zone of higher permeability materials can exist within the upper few metres of more fractured/weathered rock where higher permeability may also occur along fault zones. These zones can provide larger 'locally important' supplies of water. Generally, the lack of connection between the limited fissures results in relatively poor aquifer storage and flow paths that may only extend a few hundred metres. Due to the low permeability and poor storage capacity, the aquifer has a low 'recharge acceptance'. Some recharge in the upper, more fractured/weathered zone is likely to flow along the relatively short flow paths and rapidly discharge to streams, small springs and seeps. Groundwater discharge to streams or baseflow can massively drop off during the drier months of the summer.

A sand/gravel aquifer essentially is classed as regionally important when it can supply regionally important abstractions such as public water supplies or significant yields exceeding 400 m^3/d. It is highly permeable and more than 10 m thick or has a saturated thickness of at least 5 m and normally extends over at least 10 km^2. The Enniskerry Gravels aquifer falls into this category. Groundwater flows through the pore spaces between the sand/gravel grains, and the permeability is mainly determined by the grain size. Larger grains resulting in pore spaces, and the 'sorting' of the material, i.e. the more uniform the particles, the higher the permeability. There is a relatively uniform distribution of groundwater, good aquifer storage and long groundwater flow paths, typically limited by the aquifer's extent. Groundwater gradients are typically low ('flatter' water tables), giving relatively low groundwater velocities. There is generally a strong interaction between surface water and groundwater, with groundwater discharging into streams if the water table is high, or conversely, the surface water moving into the aquifer, if the surface water level is high. Large springs are often associated with sand/gravel aquifers, especially in low-lying areas or at the periphery of the aquifer.
The subsoils across the site are Glaciofluvial sands and gravels within the soil grouping of Lithosols and Rendzinas. Derived from mainly calcareous parent material shallow and well drained. This subsoil grouping covers the area surrounding the development site with the exception of the alluvial soils along the Glencullen river and the presence of some rock outcropping along the river to the Northeast of the site.

European Sites.

Protected area: The SAC: The site is located closely to the Knocksink Wood SAC with the following conservation objectives (7220) Petrifying springs with Tufa formation (Cratenurion),

(91A0) Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles & (91E0) Alluvial Forests with *Alnus Glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicon albae).

7220 Petrifying springs with Tufa Formation (Craetenurion).

The following attributes are of particular importance having regard to this project and its potential impacts. Regarding the ***habitat area*** there are a number of springs and seepages found on the wooded slopes within the woodland in the SAC. Overall, circa 0.135Ha of petrifying springs with Tufa formation was recorded in 2015. The habitat is a dynamic habitat in that any changes or a reduction to water supply would likely have a significant impact. The 3 subsites mapped show the locations of surveyed habitat. However it is important to note that further un-surveyed features may exist elsewhere though out the site. It is also important to note that Tufa features can decrease naturally by blockages to upwelling springs.

The ***hydrological regime*** is of critical importance for the survival of this feature. Petrifying springs require permanent irrigation from upwelling of groundwater sources and water flows should not be altered anthropogenically.

The ***ecosystems function*** regarding water quality regarding Nitrate and Phosphate, the targets for these parameters for Nitrate the maintenance of levels <10mg/L and the restoration of Phosphate to <15μg/L. Based on the survey work nitrate levels were 7.98mg/L and 5.26mg/L at two of the surveyed sites and Phosphate levels of 51 μg/L and 27 μg/L which showed that both of these areas failed to meet the attribute target.

91A0 Old Sessile oak woods with Ilex and Blechnum in the British Isles.

The following attributes are of particular importance having regard to this project and its potential impacts. Potential impacts on this conservation objective are unlikely given that this featu9re is not groundwater dependent.

91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* This habitat area occurs within the flood plain of the Glencullen River. It is also strongly associated with petrifying springs and streams on the slopes above the Glencullen River and a stream in the eastern most section of the SAC. The **hydrological regime** is normally in the form of periodic flooding and is essential to maintain alluvial forest however at Knocksink Wood SAC. The alluvial forests habitat is found along the river, and on slopes in spring-fed flushes which are subject to waterlogging.

Water framework Directive.

2019-24 Status

The subject site is located within hydrometric area 10 in the Ovoca-Vartry catchment, and down to a smaller level located within the Dargle_SC_010 sub-catchment.

The subject site is located near the Glencullen river and is located proximal to the GlenCullen_020 (IE_EA_10G020500) river waterbodies, this drains to the Dargle_030 which is of good status. The updated status for the period 2019-24 is of good status and not deemed to be at risk of attaining water framework Directive objectives with no impacts or pressures identified. However, there statistically insignificant upward trending for the following nutrients upstream of the site with regard to Total Ammonia as N and Total Oxidised Nitrogen as N. The Glencullen_010 is located upstream of the site and the updated status is high and not deemed to be at risk. There are high indicative quality regarding the parameters Total Ammonia as N and ortho-phosphate. Regarding Total oxidised Nitrogen as N the waterbody is of good indicative quality with the nutrient trending upwards but remaining far from the threshold.

The site is located within both the Wicklow groundwater body (IE_EA_G_76) and the Enniskerry gravels Groundwater body (IE_EA_G_038). The updated status based on the 2019-2024 data both of the groundwater bodies are of good status both quantitatively and chemically and not deemed to be at risk.

The site subject of this application is not drained by any watercourses or drainage ditches given the free draining nature of the material onsite. Reference is made to a surface water feature that emerges as a spring source in the middle of the proposed site. The proposed development will be served by the public surface water mains draining towards the village of Enniskerry. The development will also be served by Uisce Eireann drinking water infrastructure with wastewaters directed to the Enniskerry Wastewater Treatment Plant. This wastewater treatment system for the year of 2024 has had no exceedance's and is fully compliant with the emission limit values as set out under the wastewater discharge license (D0088-01). The wastewater treatment plant is operating well within the confines of its design capacity. Overall, the wastewater treatment plant presently is not impacting on the Water framework Directive status of the waterbody.

Issues Raised:

In the appeal submitted by Leesha O'Driscoll, the issues raised reference previous comments made by the Department of Housing, Local Government and Heritage regarding the development site which stated essentially the applicant has not been able to show beyond reasonable scientific doubt that the development will not have an impact on the Knocksink SAC. This is in light of its conservation objectives, with particular regard to the petrifying springs conservation objective attributes, mentioned earlier in my report, such as hydrological regime, height of the water-table, water flow and the target to maintain the appropriate hydrological regime. This forms the basis for the appellants principal argument which was further supported by a submission by Dr. Robert Meehan regarding the potential impact on the petrifying springs.

The site-specific conservation objectives, as outlined earlier in the report, are taken from Version 1 of 13th December 2021. The following conservation objectives (7220) Petrifying springs with Tufa formation (Cratenurion) and the (91A0) Alluvial Forests with *Alnus Glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicon albae) are of particular relevance regarding this development as the issue for the potential for the alteration of groundwater flows and hydrochemistry forms the basis for the arguments raised by Leesha O'Driscoll and which is given support by the expert opinions provided in Dr. Meehan's Report. The springs and the alluvial forests are designated priority habitats by virtue of the threat to their survival. The appellant goes further stating the mandatory responsibility of the State is to protect these features, and the burden of proof lies with the developer to establish beyond a reasonable scientific doubt that the development will not impact the aforementioned conservation objectives.

The appellant further refers to the fragile and delicate nature of the features referring to a study carried out by Lyons (2015) which states that 'the tufa deposits are inundated with constantly flowing shallow water and they are shaded by trees and coated with filamentous algae dark green (almost black) in colour. The study further refers to the rivulets throughout the area averaging 9.6mm in depth which shift laterally year to year as further tufa is deposited. The appellant uses these excerpts to substantiate the fragility and delicate nature of these groundwater dependent features.

Dr. Meehan raises three issues regarding the assessment carried out at the subject site.

- ***The delineation of a ZOC in such sand and gravel fed springs is difficult at best given the 3-dimensional subsoil geology reported at the site.***

He states that the size of a Zone of Contribution, hereafter referred to as ZOC, is controlled by the outflow with the exact shape of the ZOC controlled by groundwater flow directions and gradient as well as subsoil and bedrock permeabilities. He argues that the determination of a ZOC to a spring and estimation of both the outflow from the feature and recharge is required, he further states this is made more difficult given the 'presence of non-contiguous contribution zones', that is where there exists a complex subsoil geology up gradient of the springs. The complexity of the site is lended support by the Characterisation report for the Enniskerry Gravels groundwater body which states that the area is covered by a limestone derived sand and gravel deposits over the subject site and the intervening ground separating the springs and the site. Dr. Meehan argues that only contours were used to delineate spring catchment areas. It is also argued that trial pitting carried out and reported in Hydro Environmental Services Report (2022) has reported and shown channels of conductive and permeable material in agreement with the aforementioned characterisation report. Given this he argues that the applicant has ultimately ignored the importance of this material in the context of the site conceptual model.

- ***I still consider the ZOC to the tufa springs to be potentially at risk.***

The ZOC for the largest springs 7 & 8 was delineated by various studies. He argues here that ZOC catchment must utilise wettest conditions possible over a significant time period whilst stating that the spot flow measurements would not be reflective of best practice, which leads to differing ZOC's. It is noted that Springs 1-6 infiltrate back to ground and are deemed to be located within the ZOC of Springs 7 & 8. This would essentially mean that would form part of the ZOC for Springs 7 & 8 as the rainfall that feeds Springs 1-6 could emerge at the tufa spring. Given that no ZOC has been delineated for Springs 1-6 it is argued that the investigation is not complete.

In addition, a previous study has shown higher flows from Spring 1 at 3l/s far and above the maximum figure used in the application of 0.8l/s for the Springs 7 & 8. This would mean that a significantly larger ZOC than that for Springs 7 & 8. Given that not all of this discharge makes its way to these Springs 7 & 8 the possibility exists that it could. It is further argued that this has not been accounted for in the site conceptual model which adds to the uncertainty of same.

- ***The conceptual site model doesn't consider existing topsoils and variable subsoils as contributors to the emergent groundwater hydrochemistry.***

Dr. Meehan argues that the omission of the influence of the topsoil's overlying the sand and gravels has not been taken into account in the site conceptual model. He cites the presence of well drained material across the site which is at odds to the Enniskerry gravels GWB, and which references rendzinas and lithosols. He further states that the spring hydrochemistry is formed via rainwater falling across the site passing through both the topsoil and the subsoils (calcareous) with the receptor being the springs. The installation of the soakaways across the site at depths of 2.15m below groundwater level can only lead to the by-passing of these surface layers and the resultant alteration in hydrochemistry, he says, thus effectively not maintaining the hydrological regime or the conservation condition. He refers to the conservation objective of Knocksink Wood SAC whereby the anthropogenic alteration of groundwater flow should not be allowed to occur. There is also reference to the potential impact of gardening and landscaping practices that could lend to additional nutrient finding way to the springs already under pressure having particular regard to the levels of Phosphate which have failed historically and must be restored to <15μg/L.

Response to issues:

The applicant responded to the aforementioned arguments raised by the appellants as follows.

In an attempt to address the original issues that arose from ABP304037-19 the applicant took the following approach. They provided a detailed desk study of the site utilising all available data relating to Hydrology and hydrogeology. They reviewed all available existing site investigation data; they held the position that there exists sufficient site investigation data in addition to data pertaining to adjacent sites. This data has been supplemented by the applicant to include walkover surveys, water level measurements and spring discharge measurements. They also put forward a conceptual site model to endeavour to illustrate their understanding of the hydrogeology at the site and a catchment zone for the tufa spring. Existing data and new data is combined in a revised hydrogeological Assessment.

The applicant has regarded their hydrological and hydrogeological information to be comprehensive and robust. They outlined the methodology used to arrive at their conceptual site model and the zones of contribution. They argue that no development will occur over the defined max zone of contribution or the extreme for Springs 7 & 8. They argue that they have been ultraconservative in drawing up the catchment areas having regard to the doubling of flow to allow for a safety factor. They further argue that no evidence exists for the presence of gravel lenses and preferential flow paths occurring at the development site, further citing that no gravel pit was ever opened at the site. They also argue the inclusion of mitigation measures to remove any uncertainty regarding recharge and groundwater flow and any potential to

disrupt or alter the infiltration of rainfall to groundwater. They further reference discussion with NPWS regarding distributed recharge via soakaways as part of the drainage design.

They argue that based on topography that Spring 1 cannot discharge to Springs 7 & 8 due to topography. They further defend their assessment of springs flow referencing site visits during times of precipitation.

Regarding the soakaway issues raised in Dr. Meehans 3rd piece the applicant responded as follows: They argue that the proposals to address the matter of surface water across the site accords with the GDSDS 2005 and they state that the best practice SUDS designs for the site are designed to maintain the existing hydrological regime. SUDs soakaways for the individual houses are designed as such so as to distribute the stormwater over a larger area of the site, this has been discussed with the NPWS. The larger soakaways will treat run-off from parking and roadways servicing the site with point recharge occurring at these locations and subsequent dispersion to the existing subsoils. They further argue that the hardstanding areas, i.e. roads and rooftops, will account for 29% of the development footprint with diffuse discharge of groundwater occurring over the remaining 71% of the site.

The issues surrounding the potential impact of the GWDTE's at Knocksink has been addressed in opinion of the applicant. They state that all potential impacts on surface waters and groundwaters have been addressed in the WFD assessment. They further state that there will not be any impact on the GWDTE at Knocksink SAC with the existing hydrological regime at the site being maintained.

Discussion:

In my opinion the major concern regarding the proposed development is its potential to impact on the dynamics of existing groundwater flow and geochemistry and the potential for same to impact on the following listed priority habitats as listed under the Habitats Directive, namely the 7220 Petrifying springs with tufa formation (Cratoneurion) and 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae).

The site is mapped sitting as sitting on limestone derived glaciofluvial sands and gravels by their very nature are permeable and transmissive. This subsoil grouping encompasses the subject site and surrounding lands right down to the alluvial material along the Glencullen River. Throughout the various assessments conducted across the site this would certainly

appear to me to be supported by the presence of sands and gravels within the subsoils. It would also appear based on the information to hand that there is the potential for preferential flow paths to exist across the site and surrounding areas. I believe the documentation submitted by the applicant would lend itself to this theory.

This is further supported by the fact that across the site and the surrounding area down to the Glencullen river effective rainfall is 652.9mm/year with 85% of this recharging the underlying aquifer. Ground water recharge is indicated consistently across the site.

This is further supported when we look at the aquifer description. The site and its surrounding area is mapped as a Regionally important Sand and Gravel Aquifer deemed so by virtue of its area, permeability and thickness. Within this type of aquifer there is a relatively uniform distribution of groundwater, good aquifer storage and more importantly long groundwater flow paths, typically limited by the aquifer's extent.

The applicant has referenced in his response to the appellant's that the effective area remaining to distribute rainwaters naturally over the site will be reduced by 29%. Whereby waters will be redistributed to ground via 3 large soakaways serving the carparking area and the roadways and individual soakaways serving the houses. In my opinion, I cannot get away from the issue, that is essentially an alteration in the groundwater regime across the site and would impact how waters recharge across the site. Furthermore, I am of the opinion that the applicant has not assuaged my concerns of how the alterations of the hydrological regime across the subject site would impact on the surrounding lands and the potential knock-on impacts on the Conservation Objectives of Knocksink SAC. It is my opinion that this is at odds to the 7220 Petrifying spring with tufa formation attribute hydrological regimes target of maintaining hydrological regimes. The apparent continuity of deposits mapped across the site in my opinion leaves it difficult to discount in terms of the potential for impact beyond a reasonable scientific doubt.

Further to this I do not feel that the applicant has adequately addressed the potential for alterations to the geochemistry that may occur as a result of the proposed development. Surface waters volume and distribution across the site will be altered this cannot be ignored. Given the individual soakaways and the 3 larger soakaways this rainwater will now not be filtering via the soil and subsoil media across the site and consequently the geochemical nature of the groundwaters underlying the site will be inadvertently altered.

Conclusion.

I am of the opinion that the applicant has not ruled out the possibility of both altered groundwater geochemistry and groundwater flow dynamics across the subject site and its potential to impact on the European Site (Knocksink Wood SAC, 00725) given the nature of the soil and subsoil medium across the site and the areas separating the site and the priority habitats, in this instance namely the 7220 Petrifying springs with tufa formation (Cratoneurion) and 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae). The habitat is a dynamic habitat in that any changes or a reduction to water supply would likely have a significant impact. The hydrological regime is of critical importance for the survival of this feature. Petrifying springs require permanent irrigation from upwelling of groundwater sources and water flows should not be altered anthropogenically. I feel that the potential significant effects from the proposed development cannot be ruled out even with the mitigation measures as proposed.