| Area | а | | Impact | | | | S | pecific M | iti | |
|---|-----------------|---|---|------------------|--|--|--|--|--|--|
| Site Name | Im- portance | Nature of Impact | Description of Impact | | Impact Rating | Mitigation Measure | Residual Impact | | | |
| Polecat GWS Ch 17+750 – | High | Construction | 1 | | | 1 | T | | _ | |
| 32+750 | | Restriction and interception of subsurface flow resulting in reduction in groundwater flow and yield. Damage to Feature by Con- struction Works (collapse, infill etc.) | The proposed road and its construction site area is located inside the revised mapped recharge zone for the spring which the GSI have shown to extend some 10km west of Elphin. This area was not originally within the Polecat ZOC but was recently revised following tracer tests carried out as part of this assessment. The mapping revision which resulted in the extension of the recharge zone to include this area was solely due to a single known con- nection between Polloweneen Swallow Hole and therefore dif- fuse contributions across the entire revised ZOC are unlikely. The road is underlain by a Regionally Important bedrock aquifer with conduit flow at this location and is deemed of low vulnerabil- ity due to peat, clay and silt subsoil deposits. | | | The implementation of the CESCP will ensure no construction related impacts to the Polloween swallow hole (which is connected to the Polecat spring supply). This will include silt fences which will restrict construction activity in the vicinity of the zone of contribution. In addition, | Slight | The su assess Assess 10 Hyd Prelimi veys (2 geolog | pp m iro na 20 ica | |
| | | | | | | interception ditches (cut-off ditches) will be constructed in advance of the main ground works which will redirect overland flow into the swallow hole and maintain its current recharge regime. | | aquifer at 9.4.7 measu out on active o | a i.í re tw dis | |
| | | Potential contaminated infiltra- tion / discharge entering aquifer via karst feature construction site works construction runoff and potential spillages. | In terms of construction impacts a reasonable buffer of some 150m is available between the potential site works and the source which is sufficient to minimise any potential construction impacts involving contaminated runoff water impacting the source and any potential well yield impacts arising from temporary de- watering of excavations and potential interference with ground- water flows. | | Negligi- ble / Slight | NA | Negligible / Slight | dry per No pos source only. G collaps design | io iti ie e o | |
| | | Operational | | | | | | | | |
| | | Direct encroachment of feature by proposed road development | The road alignment passes within 150m to the North of the spring source at Ch 15+850. At this location the road alignment is at grade, to the west it is in embankment and to the east it is slightly in cut. The local road near the spring is to be realigned forming an underpass under the mainline which will involve locally deep excavation into the subsoils. There is no direct encroachment of the spring source (Polloweneen Swallow Hole) and other identi- fied collapse features in this area. | | Negligible | NA | Negligible | All of the propositested project for main specific verse in longitur | ne ec wi s. nt c l m | |
| | | Contamination of feature by road drainage outfalls and by the drainage system – Routine runoff | There are no proposed road drainage outfalls discharging to this feature and the aquifer vulnerability along the road alignment in the contribution zone is typically moderate to low vulnerability. | | | NA | Slight | where. | | |
| | | Accidental road spillage | The read alignment is leasted within the manned repharge zone Slight to The implementation of the CESCB and | | | | | The size | | |
| | | Impact of road alignment on recharge to or discharge from hydro feature | due to a single known karst connection between Polloweneen Swallow Hole and the supply spring. It is proposed to redirect cut -off drains to the swallow hole which will maintain the recharge regime of the feature. Given the impermeable nature and depth of overburden (Low aquifer vulnerability) it is highly unlikely that a preferential flow path would be encountered that would signifi- cantly impact the yield and water quality of the spring source as a result of the road development. | | Moderate | EOP will be required by the contractor. The design will ensure surface and groundwater flows in the area are main- tained largely intact. Interception ditches will be constructed in advance of the main ground works which will redirect overland flow into the swallow hole and maintain its current recharge regime. This will ensure that there is no apprecia- ble change in recharge/discharge to the | | have take feature a | | |
| Site Name | lm- portance | Nature of Impact | Description of Impact | Impa Ratin | ct Ig | spring supply. Mitigation Measure | <u> </u> | Re- sidua I Im- nact | | |
| Kilvoy and | Locally | Construction | | | | | | ματι | | |
| Corry East swallow hole and karst fea- tures Ch 18+400 to 19+300 | High | Restriction and interception of subsurface flow resulting in reduction in groundwater flow and yield. | This section of the road alignment has a number of karst swallow-hole features running near and in close proximi- ty to the road alignment. The bedrock in this area ap- pears given the density of such features to be soluble and highly karstified. The largest feature, Polloweneen swallow-hole, is a sink to a small local stream. The pro- posed road passes to the south 25m upstream of this feature. Other swallow hole features are located in prox- imity to the proposed road footprint which drain local overland flow one of which is lost completely at Cb 10:050 | Modera | ate The p these have ed an mease divers not ap | roposed road development has been routed a karst features, however stormwater drainage previously entered the area as overland flow, d conveyed away from karst areas. The CES ures outlined in Chapter 10 for overland and s sions will ensure that any reductions in flow to opreciable. | away from e, which would will be collect- CP and the stream flow the feature are | Slight | | |
| | | Damage to Feature by Con- struction Works (collapse, infill etc.). | Ch. 19+050. The geotechnical investigations show considerable weathered bedrock zones along the proposed road de- velopment at this location. There is a potential for dam- age and collapse of these features that could give rise to potential flooding issues and to sink holes. | Sligh Modera | A CESCP has been developed and will be implement contractor. These features will be fenced off with a fence. This will ensure that damage and collapse o does not occur as heavy machinery will not be allo close proximity. A double silt fence will be construct | | ented by the double silt f these features wed to work in ted along the | Slight | | |
| | | Potential contaminated infiltra- tion / discharge entering aquifer via karst feature construction site works construction runoff and potential spillages. | The construction activity will be reasonably proximate to these features which increases the risk for damage through infill, collapse and groundwater pollution from uncontrolled construction site runoff during construction activities. These swallow-holes represent point sources of pollution to the regionally important karst bedrock aq- uifer. Potential damage to the Polloweneen swallow hole could give rise to flooding as the feature drains a moder- ate size stream. | | ate site be runoff tercou runoff before A1.8 f The s propo swallo perme lar) pl treatm a dou potem | oundary so as to intercept and minimise the p from the works area to the adjacent swallow urses. Cut-off ditches will be provided to colle r; which will then pass through a temporary se e out-falling into the nearest watercourse – re for details. wallow hole at Ch. 19+045 is located in the cr sed road alignment. During the construction by hole will be excavated to bedrock and bac eable coarse grained stone (Class 6A or 6C n aced and wrapped in a geotextile membrane. nent the area around the swallow hole will be ble silt fence in order to provide protection an tial construction runoff. | ootential direct holes and wa- ect construction ettlement pond fer to Plate entre of the phase this kfilled with a naterial or simi- . Prior to this fenced off with d minimise | | | |
| | | | | | Due to consti Soilec diverti No dir Iow ho | o the presence of swallow holes in this area, i ruction material stockpiles is of the highest im d runoff from stockpiles shall be managed by ing such runoff to a sedimentation pond prior rect discharge from the works will be permitte ples at this location. | management of portance. controlling and to discharge. d to the swal- | | | |
| | | | | | Topso locatio condit any of | bil stripping in proximity to the swallow hole fe on will be undertaken as much as feasible in o tions. All stockpiles will be located no closer t f these swallow hole features. | atures at this dry weather than 10m to | | | |
| | | Operational | I goal out off drains from the marth side of the second of | N#- 1 | | ff drains from the north and active of the set | mont will be | Clink | Г | |
| | | by road alignment | Local cut off drains from the north side of the road align- ment will discharge to the Polloweneen swallow-hole feature. This swallow-hole feature shows evidence of surcharging at the feature during flood conditions. This represents a flood risk to the Road further to the east with a potential for flood waters to infiltrate and migrate in the formation layer eastwards to lower road levels. A drainage solution to mitigate this flood risk is required. | ate/ S nifica | r- Cut-oi ig- directa nt the sv porate the ro | ed to a drainage pipe at Ch.18+500 which will vallow hole. In addition two transverse barrier ed beneath the road to the east to mitigate the ad at the base of the cutting. | I discharge to s will be incor- e flood risk to | Slight | | |
| | | Contamination of feature by road drainage outfalls and by the drainage system – Routine Runoff | There are no proposed road drainage outfalls discharg- ing to these swallow hole features with the road pave- ment drainage being collected and conveyed in a sealed system eastward to outfall to a surface stream at Ch 21+150. | Sligh | nt NA | | | NA | | |
| | | Accidental Spillage | | | | | | | | |
| | | Impact of road alignment on | The karstification at this location poses a threat to the | Moder | ate Basal | reinforcement (Ch. 18+450 – Ch. 19+300 & | Ch. 20+350 – | Slight | | |
| | | recharge to or discharge from hydro feature | road stability as it represents a risk of potential collapse from the development of sink-holes. As part of the de- sign for identified karst zones beneath or close to the road development basal reinforcement will be required combined with a drainage layer to maintain existing drainage patterns | | Ch. 20 19+30 porate | 0+550 combined with a drainage layer (Ch 18 00m) to maintain existing drainage patterns ha ed into the road construction design at this loo | 3+400 – Ch. as been incor- cation. | | | |

Annual Average Water Balance Surface & Ground Water

| | Area I(II) - ZUC Cloon | lyquinn and Polecat | | |
|---|---|--|--|--|
| | Existing Col | nditions | | |
| | Surface V | Vater | | |
| | River Sub-basin Catchment & | Portion of road alignment | | |
| River Basin Catchment | Area | within sub-basin catchment | Receiving Watercourse | |
| Upper Shannon | Mantua Stream_010 | 19+600 - 24+150 | Mantua Stream | |
| Area: 675km ² | Area: 9.54km ² | Total Length: 4.55km | Breedoge River | |
| Recharge Proportion across | Catchment losses and storages | Runoff Proportion | Annual Avg. Dischagre from | |
| catchment (avg) | (avg.) | | catchment | |
| 18% | 12% | 70% | 5.34 x 10 ⁶ m ³ | |
| | Groundv | vater | | |
| Groundwater Body (GWB)* | Portion of road alignment within GWB (AT THIS AREA ONLY) | Annual Average Recharge (mm/yr) | | |
| Carrick on Shannon | 19+750 - 24+150 | 21 _ 172 | | |
| Area: 915km ² | 19+750 - 24+150 | 51- 172 | | |
| ZOCCloonyquinn | Portion of road alignment within GWB (AT THIS AREA ONLY) | ZOC Polecat | Portion of road alignment within GWB (AT THIS AREA ONLY) | |
| 25.6km ² | None | 52.3km ² | 19+600 - 24+150 | |
| | Catchment C | onditions | | |
| Annual Average Recharge | | | | |
| (mm) | Soil Type | SAAR (mm) | Effective Rainfall (mm) | |
| 106 | Peat/Cut Peat <20% Tills >80% | 1120 | 800 | |
| | Proposed Alterations | s - Ground Water | | |
| Existing Average Recharge Across GWB | Impermeable Area of Road | Reduction in recharge (max) | Proportionl Reduction in recharge to GWB | |
| 96.99 x 10 ⁶ m ³ | 0.0616km ² | $6.52 \times 10^3 \text{ m}^3$ | -0.006%* | |
| Existing Average Recharge Across Polecat ZOC | Reduction in recharge (max) to Polecat ZOC | Proportionl Reduction in recharge to Polecat ZOC | | |
| 5.54 x 10 ⁶ m ³ | 6.52 x 10 ³ m ³ | -0.12%* | | |
| *Note: this water is being divert | ed to the Mantua Stream; some po | ortion of this water may be rea | turned to the aquifer as portions | |
| of the river are losing through ke | arst areas. Additionally the majorit | ty of recharge to the Polecat Z | OC occurs as point recharge | |
| through swallow holes and ther | efore the reduction shown above i | s likely not applicable | | |
| | Proposed Alterations | s - Surface Water | | |
| Portion of road drainage draining to sub-basin catchment | Drainage Outfalls | Impermeable Area of Road | Outfall Catchment | |
| 19+600 - 24+150 | | | M | |
| 4.1km | 00121.01 & 00121.02 | 0.0525km ⁻ | Mantua Stream_010 | |
| Portion of road drainage diverted to adjacent sub-basin catchment | | Impermeable Area of Road | Annual Runoff Volume Reduction | |
| Ch.21+887 - 24+150 | | 0.0317km ² | 25.36 x 10 ³ m ³ | |
| Portion of additional road | | | | |
| drainage diverted from | | | Annual Runoff Volume | |
| adjacent sub-basin catchment | | Impermeable Area of Road | Increase | |
| Ch.17+800 - 19+600 | | 0.0252km ² | 20.16 x 10 ³ m ³ | |
| | | | Additional runoff | |
| | | | not infilltrating as groundwater | |
| | | | recharge | |
| | | | 6.52 x 10° m° | |
| | | Total Net change in discharge to Sub-basin | Total Net Proportionl change in discharge to Sub-basin | |
| | | 1.32 x 10 ³ m ³ | + 0.03% | |





