Site Name	a Im- portance	Nature of Impact	Impact Description of Impact	Impact Rating	Mitigation Measure	Sp Residual Impact	ecific I
Leggatinty swallow holes, Caves and karst features Ch 10+000 to	Locally High	Construction Restriction and interception of subsurface flow resulting in reduction in groundwater flow and yield	The proposed road development is upstream of the Leg- gatinity cave and swallow-hole features and will intercept surface streams that discharge to these features. The	Negligi- ble / Slight	N/A	Negligi- ble / Slight	Hydr Secti ried o
14+000		Damage to Feature by Construction Works.	Culverting, temporary works and diversions. The main potential damage of the road construction on these features is the potential blockage of these features by uncontrolled construction runoff sediments.	Negligi- ble / Slight	N/A	Negligi- ble / Slight	Inves cal ir level and
		Potential for contaminated infiltration / discharge entering aquifer via karst feature from construc- tion runoff and spillages.	Site runoff waters from the construction could potentially enter these features via overland flow and therefore there is a potential direct connection to the groundwater aquifer. Therefore, construction site spillages and sediments could rapidly enter these features and pollute the bedrock aquifer and downstream spring source and the receiving Carrick-	Moder- ate	A CESCP has been developed which the contractor must adhere to. This plan will ensure flows to the stream will be main- tained through culverting (refer to Chapter 10) temporary works and diversions and that there is no appreciable deterioration in water available.	Slight	gatin site v this a is pro histo
		Operational	nabranar River.		In water quality		<u> </u>
		Direct encroachment of feature by road footprint	The proposed road alignment is located well upstream of these features in peatland areas outside the Leggatinty	Negligi- ble	N/A	Negligible	The i
		Contamination of feature by road drainage out- falls and by the drainage system – Routine run- off	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.	Slight	N/A	Slight	All of meas been asso
		Impact of road alignment on recharge to or dis- charge from hydro feature	The proposed road development is upstream of the Leg- gatinty cave and swallow-hole features and will intercept surface streams that discharge to these features. In this area all contributing streams to the swallow holes will be maintained through culverting and sensitive drainage de- sign and the road formation will be prevented from acting as a longitudinal drain	Slight	N/A	Slight	Ballir spec trans act a
Bellanagare Bog SAC, SPA pNHA Ch. 10+500 to 12+500	European Site	Construction Silts and sediments arising from in stream works and works adjacent to watercourses and con- struction site runoff. Silts and sediments and nutrient pollution arising from handling of peat	This raised bog habitat system is not very sensitive in terms of water quality and soil chemistry impacts associated from road construction activities.	Negligi- ble	A Construction Sediment Erosion and Control Plan (CSECP) has been devel- oped – see Appendix 10.1. The measures outlined in the CSECP will ensure no	Negligible	The stion a Hydr Secti
		(excavation, removal, deposition) Spillages (hydrocarbons, cement etc.) into wa- tercourses and onto wetlands.	Construction spillages do not represent a significant threat to this peatland system as the road footprint is located downgradient of the Bog Sand therefore no direct hydraulic pathway exists with groundwater and surface drainage flows in a northeast direction.	Negligi- ble	adverse impacts on water quality will occur.		ried of repoi Invest cal in levels
		Disturbance due to construction machinery and carrying out of temporary works (cofferdams culverts channel diversions, sediment ponds, silt fences etc.).	There is no proposed direct encroachment into SAC, with the Road alignment located over 500m downgradient of the SAC boundary at the nearest point and therefore is well buffered from construction works and traffic.	Negligi- ble			ed in Prop gatio ing w
		Road drainage and outfalls impacting on water	There are no proposed drainage outfalls discharging direct-	Negligi-	N/A	Negligible	The
		Road drainage system – outfalls, culverts, inter- ceptor drains, diversions and truncations affect- ing the water flow regime.	the road drainage system will be negligible. The proposed road alignment is located at minimum 500m down gradient and crosses a number of drains. These drains will be maintained by culverting under the road foot-	Negligi- ble	Use of shallow toe drains with check dams as appropriate.	Negligible	ed w
		Interception of drainage paths by the permeable road formation resulting in diversion of waters and in a dewatering effects on adjacent soils	print and therefore will not affect the surface drainage of Bellanagare Bog SAC. At this location the road formation is at grade and in em- bankment. The construction of the road will require the excavation of unacceptable (soft) material beneath the road	Negligi- ble	Longitudinal barrier running along the edge of the road formation. Maintain transverse flow paths/ditches through	Negligible	All of meas
		and wetlands areas.	alignment. The Ground Investigation indicates that the depth of excavation of soft material is generally less than 2m but in places could be to 4m, particularly between 10+900 to 11+700. This soft material will be replaced by more permeable road fill material and raised to road formation level. The introduction of this fill material could give rise to drainage of the adjoining saturated peatland. Such drainage effect is likely to be local and unlikely to extend 200m upgradient into the SAC and particularly given the low permeability of the peat and the extensive network of existing deep drains near and within the perimeter of Bellanagare Bog.		culverting/piping.		asso M17 will b that t
Cloonshan- ville Bog SAC,	European Site	Construction		<u>ا</u>			
SPA pNHA Ch. 4+000 to 15+000		Silts and sediments arising from in stream works and works adjacent to watercourses and con- struction site runoff. Silts and sediments and nutrient pollution arising from handling of peat (excavation, removal, deposition)	This raised bog habitat system is not very sensitive in terms of water quality and soil chemistry impacts associated from road construction activities.	Negligi- ble	A Construction Sediment Erosion and Control Plan (CSECP) has been devel- oped – see Appendix 10.1. The measures outlined in the CSECP will ensure no adverse impacts on water guality will	Negligible	Hydr Secti ried o repor
		Spillages (hydrocarbons, cement etc.) into wa- tercourses and onto wetlands.	Construction spillages do not represent a significant threat to this peatland system as the road footprint is located up-	Negligi- ble	occur.		cal in levels and
		Disturbance due to construction machinery and carrying out of temporary works (cofferdams culverts channel diversions, sediment ponds, silt fences etc.).	There is no proposed direct encroachment into SAC, with the Road alignment located over1.7km from the SAC at the nearest point and therefore is well buffered from construc- tion works and traffic.	Negligi- ble			ed in
		Operational Road drainage and outfalls impacting on water quality:	A number of proposed road drainage outfalls (5 proposed outfalls) will discharge to surface watercourses that eventu- ally drain into the Carricknabrahar River which flows in a northerly direction along the eastern boundary of the Cloon- sanville Bog. This raised Bogland drains to the Carrick- nabrahar. The water quality impact from the road drainage	Negligi- ble	N/A	Negligible	
		Road drainage system – outfalls, culverts, inter- ceptor drains, diversions and truncations affect- ing the water flow regime.	System on this bog will be negligible. Surface runoff via streams and drains is northeast to the Carricknabrahar River. All drains and streams intercepted by the road footprint will be continued by culverting under the road. The proposed road drainage will maintain the water balance of the receiving Carricknabrahar River.	Negligi- ble	N/A	Negligible	The i propo ed w
		Interception of drainage paths by the permeable road formation resulting in diversion of waters and in a dewatering effects on adjacent soils and wetlands areas.	At this location the road formation is generally at grade or in embankment and where cuttings occur they are through hillocks and above the ground watertable. Deep groundwa- ter flows in the weathered karstified limestone bedrock is in a northeast direction towards the Carricknabrahar River and Cloonshanville Bog and low lying areas to the north and northeast. The proposed road construction will not intercept these preferential groundwater flows as excava- tion is only of superficial soft material or at cuttings above the watertable.	Negligi- ble	N/A	Negligible	All of meas been asso Ballir spec trans act a
Peatland com- plex of Raised	National Im-	Construction	This raised hog babitat system is not very sensitive in terms	Negligi	A Construction Sediment Erosion and	Slight	The
Bog and Cut- over Bog with Wet Heath & Bog woodland KER 6(a)(N), 6b(N), 6b(C), 6b(LH), 6c(N), 6c(LH), 6c(LL), Ch. 10+900 to 12+450	County Importance & Local Importance (Higher & Lower Val- ue)	and works adjacent to watercourses and con- struction site runoff. Silts and sediments and nutrient pollution arising from handling of peat (excavation, removal, deposition) Spillages (hydrocarbons, cement etc.) into wa-	of water quality and soil chemistry impacts associated from road construction activities.	Negligi-	Control Plan (CSECP) has been devel- oped – see Appendix 10.1. The measures outlined in the CSECP will ensure no adverse impacts on water quality occur.	ongrit	tion a Hydr Secti ried o repoi
		tercourses and onto wetlands. Disturbance due to construction machinery and carrying out of temporary works (cofferdams culverts channel diversions, sediment ponds, silt fences etc.).	to this peatland system. There is no proposed direct encroachment into National Important Raised Bog area of the KER but alignment en- croaches the cutover bog section of this KER.	ble Slight / moder- ate			cal ir levels and ed in Prop gatio
		Operational			·		
		Road drainage and outfalls impacting on water quality:	There are no proposed drainage outfalls discharging to this KER. The water quality impact from the road drainage system will be neglicible	Negligi- ble	N/A	Negligible	The i
		Road drainage system – outfalls, culverts, inter- ceptor drains, diversions and truncations affect- ing the water flow regime. Changes to stream channel morphology as a result of culverting, diversions, channel regrad- ing works and outfall discharges giving rise to short term erosion and deposition.	Interceptor toe drains and a culvert are proposed in the vicinity of the KER which could potentially alter the drain- age in the KER. Impact on stream channel morphology at this section will be negligible with only one pipe culvert crossing proposed and no major diversions proposed	Slight / moder- ate Negligi- ble	Use of shallow toe drains with check dams as appropriate. N/A	Slight Negligible	All of meas been asso Ballir spec trans

Annual Average Water Balance Surface & Ground Water Area 1(i) - Bellangare Bog and Cloonshanville Bog / Leggatinty

however all of the additional runoff waters will discharge to the CarricknabraherRiver

Existing Conditions										
Surface Water										
River Basin Catchment	River Sub-basin Catchment & Area	Portion of road alignment within sub-basin catchment	Receiving Watercourse							
Upper Shannon	Carricknabraher_010	Ch.5+200 - Ch.11+800	Carricknabraher River							
Area: 675km ²	Area: 18.5km ²	Total Length: 2.35km								
Recharge Proportion across catchment (avg)	Catchment losses and storages (avg.)	Runoff Proportion	Annual Avg. Dischagre from catchment							
16%	14%	70%	10.36 x 10 ⁶ m ³							
Groundwater										
Groundwater Pedy (GW/P)	Portion of road alignment within	Annual Average Recharge								
GWDTE-Bellanagare Bog	GVVB	(11111/91)								
Area: 42.2km ²	Ch.10+150 - Ch.14+500	32 - 193								
Catchment Conditions										
Annual Average Recharge (mm)	Soil Type	SAAR (mm)	Effective Rainfall (mm)							
128	Peat/Cut Peat >50% Tills <50%	1120	800							
	Proposed Alterati	ons - Ground Water								
Existing Average Recharge Across GWB	Impermeable Area of Road	Reduction in recharge (max)	Proportionl Reduction in recharge to GWB							
$5.44 \times 10^{6} \text{ m}^{3}$	0.069km ²	$8.83 \times 10^3 \text{ m}^3$	-0.16%*							
*Note: this water is being diverted to	*Note: this water is being diverted to the Carricknabraher River: some portion of this water may be returned to the									
aquifer as portions of the river are losing through karst areas										
Proposed Alterations - Surface Water										
Portion of road drainage draining to sub-basin catchment	Drainage Outfalls	Impermeable Area of Road	Outfall Catchment							
Ch.4+750 - Ch.12+200 3.2km	OUT5.01 & OUT10.1	0.0477km ²	Carricknabraher_010							
Additional runoff	Proportion Increase									
recharge	have been									
$6.1 \times 10^3 \text{ m}^3$										
**Note: 26% of this additional water	**Note: 26% of this additional water will be diverted from the adiacent river sub-basin Carricknabraher 020 catchment.									
Note. 20% of this additional water will be alverted from the dajacent river sub-basin carricknubraner_020 catchment,										







