Chapter 10 Hydrology

10.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the hydrological assessment of the proposed construction and operational phases of the Dursey Island Cable Car and Visitor Centre. This chapter sets out the methodology used in the assessment (Section 10.2), the likely significant impacts associated with the construction and operational phase of the project (Section 10.5), the proposed measures to mitigate identified significant impacts and monitoring regime (Section 10.6) and residual impacts post mitigation (Section 10.7).

10.2 Methodology

10.2.1 Guidelines

This chapter has been prepared having due regard to the relevant guidance documents which are listed below:

- Environmental Protection Agency (EPA) (2002). *Guidelines on the Information to be contained in Environmental Impact Statements*;
- EPA (2003). *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements*;
- EPA (2015) *Draft Guidelines on the Information to be contained in Environmental Impact Statements*;
- Transport Infrastructure Ireland (TII; formerly National Roads Authority (NRA)) (2009). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*; and,
- TII (2008). *Guidelines for the crossing of watercourses during the construction of National Road Schemes*.

10.2.2 Hydrology Assessment Methodology

The hydrological assessment includes an assessment of published literature available from various sources including a web-based search for relevant material. Site specific topographical information and aerial photography has been reviewed to locate any potential features of hydrological interest, and these have been investigated on the ground by a walkover survey in order to assess the significance of any likely environmental impacts on them.

Available topographical and hydrometric information (field and desk based) has been used to perform hydrological impact assessments of the proposed development. All watercourses and waterbodies which could be affected directly (i.e. crossed, discharged to or realigned/ diverted) or indirectly (i.e. generally lie within 250m of the development) were assessed through an initial walkover visit followed up by a detailed desk study and hydrological assessment.

10.2.3 Field Surveys

Field surveys and walkover assessments were carried out to assess the hydrological impacts of the proposed development. A detailed topographic survey was made at areas where hydrological impacts were likely to occur.

Existing Information

A desk study was completed in order to obtain information on Hydrology using the following sources:

- Geological Survey of Ireland (GSI) – Bedrock Geology;
- Teagasc – Subsoil Map;
- Aerial Photography;
- Environmental Protection Agency (EPA) Surface Water Quality;
- EPA Viewer WFD Scores for Rivers, Transitional Water Bodies and Coastal Waters;
- OPW Preliminary Flood Risk Assessment Mapping (pFRA);
- Irish Coastal Protection Strategy Study (ICPSS);
- OPW Catchment Flood Risk Assessment and Management Mapping (CFRAMs);
- Floodmaps web mapping and;
- GSI Web Mapping

10.3 Description of Site and Proposed Development

The location of the proposed development is directly adjacent to the existing cableway, which straddles the Dursey Sound, connecting the easternmost tip of Dursey Island with the townland of Ballaghboy, on the western end of the Beara Peninsula in west County Cork. The proposed cableway will run parallel to the existing alignment offset by approximately 14m to the north. The end-to-end length of the proposed cableway will be approximately 375m which is slightly shorter than the length of the existing cableway.

The proposed development will include the construction/completion of the following elements at the site of the existing Dursey Island cableway:

- A two-car desynchronised reversible ropeway cableway with a capacity of 200-300 passengers per hour in each direction;
- Two pylons– one each on the mainland and island;
- A mainland cableway station (including all necessary operating machinery, facilities for operating staff, and platform for embarking/disembarking);
- An island cableway station (including all necessary operating machinery, platform for embarking/disembarking, a sheltered waiting area and welfare facilities);
- A mainland-side Visitor Centre with gift shop;
- A mainland-side café with approx. 84 seats, toilet block and outdoor balcony area overlooking the Dursey Sound;
- A mainland-side visitor car park with approx. 100 no. parking spaces and 1 no. bus bay;
- Retention of a small island-side residents' car park (approx. 10 spaces);
- Upgrades of associated utilities infrastructure (including wastewater treatment systems and mainland-side telecommunications connectivity);
- Upgrades to the existing water supply distribution network on the Mainland including a new groundwater well, reservoir tanks and watermains;

- Rainwater harvesting to supply toilets on island;
- Road improvement works including the widening of the carriageway at 11 locations (10 no. passing bays and 1 no. visibility splay) and further road improvements to include pavement and verge works at a number of other locations on the mainland-side approach road (R572);
- Removal of existing cableway infrastructure, mainland-side visitor car park and island and mainland-side station buildings;
- The retention of certain aspects of the existing cableway (mainland pylon, section of mainland machinery and cable car itself) as relics of industrial architectural and cultural heritage value;
- Soft and hard landscaping; and
- All other ancillary works.

The visitor centre will be situated at +17m AOD, with the café and mainland station at +17.5m and +18m AOD respectively. The mainland pylon will be located approximately 40m south-west of the mainland station at an elevation of 6m AOD and overall height of 32.5m.

On the island site the new return station will be provided alongside the existing platform. The island station / platform will be constructed at existing grade (approximately 21.5m AOD) and the pylon will be located 35m northeast of the station building at an elevation of 18m AOD necessitating a 22m high pylon.

10.4 Description of the Receiving Environment

10.4.1 Regional and Local Hydrology

The proposed development spans the Dursey Sound, part of the North Atlantic Ocean. Dursey Island forms the most westerly extent of Kenmare bay to the North and Bantry Bay to the South. Surface water features located in the vicinity of the proposed development are located entirely within the South Western River Basin District. A minor watercourse discharges to the sea at the south east of the proposed development.

The proposed development is located within Hydrometric Area No.21 (Dunmanus-Bantry-Kenmare). This catchment includes the area within Counties Cork and Kerry draining to Ballinskelligs Bay, Kenmare Bay, Bantry Bay and Dunmanus Bay. The largest urban centre in the hydrometric area is the town of Bantry.

The proposed development site is within "Fanahy_SC_010" WFD sub-catchmnet which is within the Dunmanus-Bantry-Kenmare WFD catchment.

There is a groundwater well on site that provides a water supply to the existing welfare facilities at the mainland cable car station.

10.4.2 Existing Surface water Drainage

Surface water runs off the existing areas of hard standing and either infiltrates to ground in the grassed areas or continues as overland flow over the cliff faces before discharging to the sea.

A minor watercourse is culverted under the R572 at the site's eastern boundary. This subsequently discharges to sea over the cliff face.

10.4.3 Wastewater Treatment

The mainland cableway welfare facilities are being discharged to an on-site septic tank, which is periodically de-sludged.

There are no public toilets available to visitors on the island side of the site. There is no formal wastewater drainage and treatment system in place on the island. The island residences are serviced by private septic tanks.

10.4.4 Flood Risk

The flood risk at the proposed Dursey Island Cable Car and Visitor Centre has been assessed as part of this study. Previous flood studies have been undertaken as part of the PFRAMs & Irish Costal Protection Strategy Study.

10.4.4.1 OPW Preliminary Flood Risk Assessment

To inform the Flood Risk Assessment (FRA), the OPW Preliminary Flood Risk Assessment (PFRA) mapping was consulted as an initial screening. As required by the EU Floods Directive, the OPW carried out a PFRA to identify areas where the risk of flooding may be significant. The PFRA is a broad scale assessment based on historic flooding, predictive analysis and consultation with local communities and experts. As part of the PFRA, maps of the country were produced showing the indicative fluvial, pluvial and tidal flood extents. Areas for Further Assessment (AFA's) were identified.

The PFRA map at the proposed development location indicates that the site is located outside fluvial 0.1%AEP or coastal flood 0.1%AEP flood extents. The PFRA mapping also does not indicate any pluvial or groundwater flooding within or in the vicinity of the proposed crossing.

10.4.4.2 OPW Irish Coastal Protection Strategy Study (ICPSS)

The Irish Coastal Protection Strategy Study (ICPSS) is a national study that was commissioned in 2003 with the objective of providing information to support decision making about how best to manage risks associated with coastal flooding and coastal erosion.

The published tidal flood extent mapping indicates that the development site is outside the 1 in 1000 year tidal flood extents including climate change. The extreme water levels (including storm surge) calculated as part of the ICPSS are given in Table 10.1 below.

Table 10.1 Predicted Extreme Water Levels Associated with Combined Tide and Surge (ICPSS)

Return Period	Current Climate Scenario (mOD Malin)	Mid-Range Future Scenario (mOD Malin)	High-End Future Scenario (mOD Malin)
1 in 200 Year	2.39	2.89	3.39
1 in 1000 Year	2.53	3.03	3.53

10.4.5 EPA Monitoring River Programme

The EPA carries out water quality assessments of rivers, transitional and coastal water bodies as part of a nationwide monitoring programme. Data is collected from

physico-chemical and biological surveys, sampling both river water and the benthic substrate (sediment).

Water sampling is carried out throughout the year and the main parameters analysed include: conductivity, pH, colour, alkalinity, hardness, dissolved oxygen, biochemical oxygen demand (BOD), ammonia, chloride, ortho-phosphate, oxidised nitrogen and temperature.

As is the case for rivers and lakes the impact of nutrient enrichment and the process of eutrophication is also a major concern in the tidal waters environment. The direct negative effects of excessive nutrient enrichment include increases in the frequency and duration of phytoplankton blooms and excessive growth of attached opportunistic macroalgae. The subsequent breakdown of this organic matter can lead to oxygen deficiency which in turn can result in the displacement or mortality of marine organisms. As such the effects of over enrichment can severely disrupt the normal functioning of tidal water ecosystems.

The status of individual riverine and coastal water bodies is assessed using the EPA's Trophic Status Assessment Scheme (TSAS). This assessment is required for the Urban Waste Water Treatment Directive and Nitrates Directive. The scheme compares the compliance of individual parameters against a set of criteria, indicative of trophic state (Table 10.2). These criteria fall into three different categories which broadly capture the cause effect relationship of the eutrophication process, namely nutrient enrichment, accelerated plant growth, and disturbance to the level of dissolved oxygen normally present.

Table 10.2 Biological River Water Quality Classification System

Trophic Status	Pollution Status	Condition
Unpolluted	Unpolluted	Unpolluted water bodies are those which do not breach any of the criteria in any category
Intermediate	Unpolluted	Intermediate status water bodies are those which breach one or two of the criteria
Potentially Eutrophic	Slightly polluted	Potentially Eutrophic water bodies are those in which criteria in two of the categories are breached and the third falls within 15 per cent of the relevant threshold value
Eutrophic	Polluted	Eutrophic water bodies are those in which criteria in each of the categories are breached, i.e. where elevated nutrient concentrations, accelerated growth of plants and undesirable water quality disturbance occur simultaneously

The Atlantic Sea at the proposed development site had an EPA Coastal Water Quality Status of "Unpolluted" from 2010-2012 and a Water Framework Directive (WFD) Status of "Unasigned" from 2010-2015.

The WFD 'Water Matters' website mapping section provides details on the assessments of the water bodies / sub catchments in the study area. This data was reviewed as part of this assessment and a summary is given in Table 10.3.

Table 10.3 WFD Classification of Coastal Waters Near the Proposed Dursey Island Cable Car and Visitor Centre (2010-2015 Sampling period, EPA)

Waterbody	Code	Status	Risk	Heavily Modified Status
Ballydonegan_010	IE_SW_21B040880	Unassigned	Not at risk	No
South Western Atlantic Seaboard	IE_SW_150_0000	Unassigned	Not at risk	No
Outer Bantry Bay	IE_SW_170_0000	High	Under Review	No
Outer Kenmare River	IE_SW_190_0000	Good	Not at risk	No

The minor watercourse which runs along the eastern boundary of the proposed development on the mainland is designated "Ballydonegan_010" under the WFD. It is yet to be assigned a status under the WFD. It must be noted that the WFD assessment considers the entire waterbody sub-catchment whereas the EPA monitoring results are point measurements at discrete locations.

10.5 Potential Impact Assessment

This section will describe the impacts associated with the proposed development before mitigation measures are applied. Both direct and indirect impacts will be addressed for the construction and operation of the proposed development. The nature, extent and duration of the impacts will also be assessed.

10.5.1 Methodology

The assessment of hydrological impacts for the proposed development has been based on the analysis and interpretation of the data acquired during the site specific investigations undertaken as part of the EIA, including the ecological study, intrusive site investigation, material assets survey, topographical survey and hydrological walkover and surveys. The procedure follows the guidelines set out in the publication 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes', NRA (TII).

Key hydrological receptors identified in the vicinity of the development include:

- The Kenmare SAC (European Designated Site);
- The Beara Peninsula SPA (European Designated Site);
- Ecologically sensitive surface water features and catchment systems; and,
- Flood Risk Areas.

10.5.2 Construction Impacts

Construction activities pose a significant risk to watercourses, particularly contaminated surface water runoff from construction activities entering the watercourse.

Construction activities within and alongside surface waters can contribute to the deterioration of water quality and can physically alter the watercourse bed, bank and coastal morphology with the potential to alter erosion and deposition rates in the vicinity of the development. Activities within or close to the watercourse channels

can lead to increased turbidity through re-suspension of bed sediments and release of new sediments from earthworks. The potential impact is moderate to significant.

The main contaminants arising from construction runoff include:

- Elevated silt/sediment loading in construction site runoff. Elevated silt loading can lead to long-term damage to aquatic ecosystems by smothering spawning grounds and gravel beds and clogging the gills of fish. Increased silt load in receiving watercourses stunts aquatic plant growth, limits dissolved oxygen capacity and overall reduces the ecological quality with the most critical period associated with low flow conditions. Chemical contaminants in the watercourse can bind to silt which can lead to increased bioavailability of these contaminants. Should significant sediment loading occur in Dursey Sound the associated impact rating is assessed as moderate to significant.
- Spillage of concrete, grout and other cement based products. These cement based products are highly alkaline (releasing fine highly alkaline silt) and extremely corrosive and can result in significant impact to watercourses altering the pH, smothering the stream bed and physically damaging fish through burning and clogging of gills due to the fine silt. Construction spillages, if uncontrolled, represent a moderate impact on Dursey Sound.
- Accidental Spillage of hydrocarbons from construction plant and at storage depots / construction compounds. Construction spillages, if uncontrolled, represent a Moderate Impact to Dursey Sound.
- Faecal contamination arising from inadequate treatment of on-site toilets and washing facilities – this represents a slight impact to the waters of Dursey Sound.

10.5.2.1 Impact on Flooding

No works are to take place below the high-water mark. No area of the proposed development works has been identified to flood. The proposed construction works will have no impact on coastal flooding.

10.5.2.2 Human Health Impacts

Due to the location of the proposed development (including the boring of a new water supply well) close to an existing abstraction point in an extreme groundwater vulnerability area there is potential for groundwater contamination to occur during construction stage. There are no bathing waters located in proximity to the proposed development. There is a potential moderate to significant effect on Human health during the construction phase.

10.5.3 Operational Impacts

The potential impacts as a result of the operational phase of the development are outlined below.

10.5.3.1 Impact on Flooding

All components of the proposed development will be significantly above the 1 in 1000 year + climate change level of 3.53mOD as derived as part of the ICPSS hydraulic modelling. The proposed development will have no impact on coastal flooding.

10.5.3.2 Predicted Impact of Storm Discharge on Flooding / Morphology

The existing surface water drainage pathways on the site will be altered as a result of the development. However, source and receptors remain the same and as a result, the impact is deemed to be slight.

10.5.3.3 Hardstanding Runoff

As a result of the proposed development, increased runoff from hardstanding areas such as roads, parking bays, roofs and footpaths will be generated. Unmitigated, this would increase the rate of runoff from the site and as a result, the associated potential effect is deemed to be moderate to significant.

10.5.3.4 Foul Sewers / Treatment

The existing drainage network will be upgraded and expanded to accommodate the anticipated increase in visitors. New waste water treatment systems will be implemented at both the mainland and island facilities. Treated effluent will discharge to ground. The mainland WWTS will require pumping to a raised infiltration area. Due to the reliance on pumps, there is a potential moderate to significant effect on the receiving environment if the pumps fail.

10.5.3.5 Predicted impact of Storm Discharge of pollutants

Salt and grit applications to trafficked surfaces to mitigate icy conditions will result in an increased salinity, pH, conductivity and total dissolved solids concentrations to receiving aquatic system. Increased salinity of watercourses can alter the ecological balance of the aquatic system and increase the bioavailability of chemical contaminants. It is anticipated that the use of salts and grits will be minimal due to the light trafficking during the winter months.

The potential impact associated with discharging untreated surface water into Dursey Sound which is in close proximity to the Kenmare SAC & The Beara Peninsula SPA is considered moderate to significant, due to the environmental sensitivities of the area.

The proposed development also requires the draining of retaining walls, the retaining wall drainage will discharge to the minor watercourse on the eastern boundary of the site. Due to the potential preferential pathway for contaminates, the unmitigated impact on water quality is predicted to be slight to moderate.

10.5.3.6 Water Quality Impact - Accidental Spillage Risk Assessment

The risk of pollution to both surface and groundwater resulting from accidental spillage is considered to be negligible. The cableway traffic is limited to pedestrians. It is not anticipated that any chemicals or hydrocarbons will ever be transported across the cableway. There was no spillage risk identified as part of the spillage risk assessment.

10.5.3.7 Human Health Impacts

No potable water supply is to be provided at the Island cableway terminal. Toilets will be supplied by rainwater harvesting. Consumption of the rainwater by people could cause illness due to build-up of organic matter on collection surfaces. The unmitigated human health impacts are predicted to be moderate to significant.

10.6 Mitigation and Monitoring Measures

10.6.1 Construction Mitigation

As is normal practice with road infrastructure projects, a draft Environmental Operating Plan has been prepared for the Dursey Island Cable Car and Visitor Centre and the following will be implemented as part of this plan:

- A draft Incident Response Plan detailing the procedures to be undertaken in the event of spillage of chemical, fuel or other hazardous wastes, non-

compliance incident with any permit of license or other such risks that could lead to a pollution incident, including flood risks.

- Implement the Environmental Operating Plan contained in Appendix 4.1 of Volume 2 of this EIAR.

A draft EOP has been developed and is provided in Appendix 4.1 of Volume 2 of this EIAR. These will be developed by the selected construction contractor to suit the detailed construction methodology and allocate responsibilities to individuals in the construction team. In doing so, the measures detailed in the appended reports will be considered minimum requirements to be considered and improved upon. The level of detail provided within the current drafts of the Plans is sufficient to allow an assessment of the anticipated impacts including residual impacts.

During construction, cognisance will have to be taken of the following guidance documents for construction work on, over or near water.

- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland).
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.
- CIRIA C648 Control of Water Pollution from Constructional Sites.
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA/TII, 2006).

Based on the above guidance documents concerning control of constructional impacts on the water environment, the following outlines the construction phasing and the principal mitigation measures that will be prescribed for the construction phase in order to protect waterbodies, the wider catchment and ecologically protected areas from direct and indirect impacts.

Proposed General Mitigation Measures

- Site works will be limited to the minimum required to undertake the necessary elements of the project;
- As far as is practicable, construction works shall proceed within predetermined Construction Areas on a phased basis. These areas will be determined by the contractor during the construction phase of the project.
- Surface water flowing onto the construction area will be minimised through the provision of berms, diversion channels or cut-off ditches.
- Management of excess material stockpiles to prevent siltation of surface waterbodies through runoff during rainstorms will be undertaken. This may involve allowing the establishment of vegetation on the exposed soil and the diversion of runoff water from these stockpiles to the construction settlement ponds.
- Protection of waterbodies from silt load will be carried out through the use of timber fencing with silt fences or earthen berms to provide adequate treatment of runoff to surface waterbodies.
- Settlement ponds, silt traps and bunds will be used. Where pumping of water is to be carried out, filters will be used at intake points and discharge will be through a sediment trap.
- The anticipated site compound/storage facilities will be fenced off at a minimum distance of 10m from the top of the edge of the sea/cliff edge. Any works

within the 10m buffer zone will require measures to be implemented to ensure that silt laden or contaminated surface water runoff from the compound does not discharge directly to the sea/watercourse. See the OCEMP within the EOP in Appendix 4.1.

- Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with the NRA/TII document "Guidelines for the crossing of watercourses during the construction of National Road Schemes". All chemical and fuel filling locations will be contained within bunded areas and set back a minimum of 20m from watercourses.
- Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent pollution;
- The construction discharge will be treated such that it will not reduce the environmental quality standard of the receiving waterbodies;
- Riparian vegetation (if present) along the minor watercourse will be fenced off at a distance of 3m either side of the proposed crossing point to provide a buffer zone for its protection;

Specific Mitigation Measures - Concrete Works

The use and management of concrete close to surface water bodies must be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. As the use of concrete cannot be avoided the following control measures will be employed:

- Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;
- When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;
- Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;
- Placing of concrete near surface waterbodies will be carried out only under the supervision of the Ecological Clerk of Works (ECoW);
- There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately and runoff prevented from entering surface waterbodies;
- Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface waterbodies and lakes;
- On-site concrete batching and mixing activities will only be allowed at the identified construction compound areas;
- Washout from concrete lorries, with the exception of the chute, will not be permitted on site and will only take place at the construction compound (or other appropriate facility designated by the manufacturer);
- Chute washout will be carried out at designated locations only. These locations will be signposted. The Concrete Plant and all Delivery Drivers will be informed of their location with the order information and on arrival to site; and
- Chute washout locations will be provided with an appropriate designated, contained impermeable area and treatment facilities including adequately sized

settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's Waste Management Plan.

10.6.1.1 Human Health Impacts

The risk to the groundwater supply will be mitigated by restricting the use of the existing groundwater well as a potable water supply during construction. Instead potable water shall be brought to site. In addition, with the application of standard construction methods, the EOP and mitigation measures detailed in this chapter, any impacts to water supply and quality are found to be unlikely and temporary in nature. Therefore, there is a slight impact on human health during the construction phase. Physico-chemical groundwater quality monitoring will be undertaken prior to and post construction (refer to Section 10.6.3 below).

10.6.2 General Operational Mitigation

10.6.2.1 Hardstanding Runoff

As a result of the increase in hardstanding areas on the mainland, runoff from the site will increase. The proposed surface water drainage system will comprise predominantly SuDS features which will attenuate and treat the surface water runoff from the site prior to discharge to sea. Permeable paving will allow infiltration to the underlying subsoils.

There will be no net increase of hardstanding area at ground level on the island side cableway station and thus the volume of surface water runoff will remain the same as currently.

These proposed mitigation measures reduce the associated impact from hardstanding runoff from slight/moderate to imperceptible. Treatment to runoff generated will be provided within the pavement layers through the processes of filtration, biodegradation, adsorption of pollutants and the settlement and retention of solids within the pavement layers.

10.6.2.2 Foul Drainage Infrastructure Failure

In the event of a pump failure at the proposed foul pumping station, mitigation measures have been proposed. The pumping station has been designed to provide 24-hour effluent storage in case of failure. Standby pumps will also be provided.

10.6.2.3 Impact of Storm Discharge of pollutants

It is proposed that surface water from the proposed development discharges to the Dursey Sound, which is an environmentally sensitive area. Mitigation measures that will be implemented include the design of a surface water drainage system to serve the proposed development. The proposed surface water drainage system will comprise predominantly SuDS features which will attenuate and cleanse the surface water runoff from the site prior to discharge to sea by percolation into the subsoil. The incorporation of a SuDS based approach will ensure that discharge will be controlled, and treatment of runoff will take place within the SuDS components. The implementation of these mitigation measures will reduce the associated impact from moderate/significant to imperceptible.

The proposed retaining wall drainage will incorporate a hydrocarbon separator prior to discharging to the minor watercourse. The implementation of this mitigation measure will reduce the associated impact from slight/moderate to slight. Physio-

chemical water quality monitoring will be undertaken at the outfall location prior to and post construction (refer to Section 10.6.3 below).

10.6.2.4 Human Health Impacts

All rainwater outlets including sinks and faucets will bare clear warnings as to the hazard posed by rainwater consumption. The implementation of this mitigation measure will reduce the associated impact from moderate/significant to slight.

10.6.3 Monitoring

10.6.3.1 Surface water Monitoring

It is envisaged that surface water sampling and chemical testing will be undertaken immediately downstream of the proposed outfall location in the minor watercourse. Surface water samples will be tested for physical and chemical parameters to assess water quality and indicate possible contamination at the site. The water samples will be tested for the following parameters:

- Biochemical Oxygen Demand (BOD);
- Chemical Oxygen Demand (COD);
- pH value;
- Suspended Solids;
- Total Coliforms;
- Ammonia;
- Nitrate;
- Nitrite;
- Ortho Phosphate; and
- Hydrocarbons.

The surface water monitoring regime will be undertaken prior to, during and after completion of the proposed works. Samples will be taken at fortnightly intervals from the minor watercourse with a minimum of 4 samples taken prior to the works and 6 samples taken after completion of the works.

10.6.3.2 Groundwater Monitoring

Groundwater sampling will also be undertaken prior to, during and after completion of the proposed works form the existing and proposed groundwater well. Samples will be taken at fortnightly intervals from each well with a minimum of 4 samples taken prior to the works and 6 samples taken after completion of the works. The groundwater samples will be tested for a range of physical and chemical parameters (as listed in section 10.6.3.1 above) in order to assess water quality and indicate possible contamination at the site.

10.7 Residual Impacts

10.7.1 Construction Phase

Construction shall be undertaken in accordance with the measures outlined in the Environmental Operation Plan in Appendix 4.1 of Volume 2 of this EIAR. There will therefore be a slight residual impact during the construction of the Dursey Island Cable Car and Visitor Centre.

10.7.2 Operational Phase

The use of SuDS features will mitigate any potential impacts relating to changes in runoff rates and volumes whilst also maintaining quality of water the vicinity of Dursey Sound. There will, therefore, be an imperceptible impact from development in the operational phase.

10.8 Difficulties Encountered

There were no difficulties associated with this assessment.

10.9 References

EPA (2019). *EPA Maps*

GSI (2017). *Groundwater Data Viewer*

Natural Environment Research Council (NERC) (2017). *Bedrock Geology Map of the United Kingdom and Ireland*.

Office of Public Works (OPW) (2013). *Technical Report: Irish Coastal Protection Strategy Study Phase IV – South West Coast – Work Packages 2, 3 & 4A*. Report prepared by RPS for the OPW.

Teagasc (2019). *Soil Maps*