Natura Impact Statement

In support of the Appropriate Assessment process

For a Proposed Residential Development; Knockboy Manor

At Knockboy, Co. Waterford.

Prepared for:
Jackie Greene Construction Ltd.

Prepared by:
Cluain Ecology Ltd.

cluainecology

Rev April 2019

Executive Summary

This report presents the results of a Natura Impact Statement (NIS) which forms part of the appropriate assessment (AA) process to identify whether significant effects on any Natura 2000 site are likely to arise as a result of a proposed residential development Knockboy Manor at Knockboy, Waterford. This NIS has been completed as part of a Strategic Housing Development (SHD) planning application for this proposed residential development.

During an initial screening in support of appropriate assessment, which examined for potential significant effects on all Natura 2000 sites within 15km of the proposed development site, it is objectively concluded that no significant effects arising from the proposed development are likely to occur in relation to other relevant Natura 2000 sites; Tramore Back Strand SPA, Mid-Waterford Coast SPA, Hook Head SAC and Bannow Bay SAC & SPA, and as such those Natura 2000 sites are considered outside the 'zone of influence' of the proposed development.

Based on the information presented in this NIS, which considered the likely changes to the Natura 2000 site; The Lower River Suir SAC and downstream River Barrow and River Nore SAC, arising as a result of the proposed development, it is objectively concluded that no significant effects on these designated site are likely to occur.

Contents

1.Introduction

Cluain Ecology Ltd. was commissioned by Jackie Greene Construction Ltd., to prepare a Natura Impact Statement (NIS) in support of the Appropriate Assessment (AA) process for a proposed residential development; Knockboy Manor at Knockboy, Co. Waterford. This NIS has been completed as part of a SHD planning application for this development, where feedback received during a pre-application SHD consultation stage with An Board Pleanála (ABP) was taking into account. The completion of this NIS has been advised by the competent authorities primarily due to uncertainties surrounding the potential for significant (including cumulative) effects on the Lower River Suir SAC, in the absence of NIS (as described in 1.2 below).

1.1. Background to Appropriate Assessment

The obligation to undertake a NIS derives from Article 6(3) and 6(4) of the E.U. Habitats Directive (92/43/EEC). The E.U. Habitats Directive has been transposed into Irish law under Part X AB of the Planning and Development Act 2000-2015 and the European Communities (Birds and Natural Habitats) Regulations 2011-2015. The NIS process consists of up to four stages, where each stage follows on from the preceding stage as necessary. In Stage 1, an initial screening in support of AA is undertaken to identify whether any significant effects on a Natura 2000 site are likely to arise from the proposed project or plan in question (either alone and/or in-combination with other known plans or projects), which has been designated under the E.U. Habitats Directive*, i.e.* Special Area of Conservation (SAC), or the E.U. Birds Directive (2009/147/EC), *i.e.* Special Protection Area (SPA). Collectively, SAC's and SPA's are known as Natura 2000 sites. If based on the results of a screening in support of AA significant effects are considered likely, some uncertainties remain, or the screening process becomes over complicated, then the process moves to Stage 2 AA, where the potential impacts are assessed further, and suitable mitigation is considered (as/if required). If on completion of stage 2 AA, it is considered that mitigation measures will not satisfactorily reduce potentially significant effects on a Natura 2000 site, and as such the potential for such effects remain, then an assessment of alternative solutions is considered in Stage 3 of the process. This is subsequently followed by Stage 4, in the event that significant effects remain, but the proposed project or plan is considered to be of Imperative Reasons of Overriding Public Interest (IROPI), and as such Stage 4 allows for an assessment of compensatory measures which may be implemented. The outcome of a Stage 2 AA and subsequent assessment stages is presented in a NIS report.

If after initial considerations of the plan or project, undertaken as part of a screening in support of AA (*i.e.* Stage 1), there are any uncertainties surrounding the potential for significant effects or it is considered that without mitigation the proposed plan or project (either alone or in combination with other plans or projects) is likely to have a significant, potentially significant, or uncertain effects on the integrity of a Natura 2000 site, or it the screening process becomes overly complicated, it is deemed sufficient to move directly to Stage 2 AA of the NIS, without completion of a detailed screening assessment report (European Commission, 2001).

During an initial screening in support of the AA process, which examined for potential significant effects on all Natura 2000 sites within 15km of the proposed development site, it is objectively concluded that no significant effects (alone or in-combination), arising from the proposed development, are likely to occur in relation to other relevant Natura 2000 sites; Tramore Back Strand SPA, Mid-Waterford Coast SPA, Hook Head SAC and Bannow Bay SAC & SPA and as such all other relevant Natura 2000 sites are considered outside the zone of influence of the proposed residential development. The reasons for this screening in support of AA conclusion in relation to other designated Natura 2000 sites are presented in Section 2.4, with a finding of no significant effects report presented in Appendix A of this NIS.

This NIS has been completed due to the location of the proposed development site in relation to the Lower River Suir SAC and downstream River Barrow and River Nore SAC, due primarily to uncertainties, which have arisen in relation to the potential for significant effects, (either alone or in combination), on the conservation objectives of these designated sites, (*e.g.* primarily Atlantic Salt Meadow or saltmarsh habitat (1330)), as a result of the proposed surface/storm water and waste-water/effluent drainage from the proposed development. Therefore, this NIS assesses for the potential significant effects the proposed development may have on the qualifying interests of the Natura 2000 sites; The Lower River Suir SAC and downstream River Barrow and River Nore SAC. An objective conclusion of no potential for significant effects is presented only where there is a high degree of certainty that no significant effects on the conservation objectives of these designated Natura 2000 sites will arise as a result of the proposed development.

1.2 Reason for progressing to NIS.

One of the reasons and considerations for refusal of a previous development application for the same site by ABP (11.12.17, planning ref. 16/833 and ABP case reference 248547) related to uncertainty over whether the proposed development individually, or in combination with other plans or projects, would not be likely to have a significant effect on the Lower River Suir SAC in the absence of a NIS as follows (after ABP Direction dated 11.12.17);

"On the basis of the information provided with the application and appeal and in particular having regard to the uncertainties regarding the adequacy of the sewerage and surface water drainage proposals for the development, and the in-combination effects of sewage overflows from this and other residential developments in the area, and in the absence of a Natura Impact Statement, the Board cannot be satisfied that the proposed development individually, or in combination with other plans or projects, would not be likely to have a significant effect on the Lower River Suir Special Area of Conservation (site code 002137) in view of the site's conservation objectives. In such circumstances the Board is precluded from granting permission".

This reason/consideration from ABP was informed by discussions during the associated oral hearing of case reference 248547, where various impacts potentially relevant in relation to the qualifying interests of the Lower River Suir SAC (Atlantic Salt Meadow ASM 1330 in particular, which is a saltmarsh habitat) that needed to be adequately assessed. These potential impacts are summarised as follows (after ABP Inspector's Report dated 08.11.17);

- Pollution/contamination impact on saltmarsh habitat along with other qualifying interests such as salmon, twaite shad, otter arising from raw sewage release, silt build-up in the system, surface-water backing-up onto the road and by-passing attenuation. Please note that reference to raw sewage release especially refers to an existing 900mm Ø combined outfall (SWOs) associated with the nearby Island View pumping station that discharges raw sewage into the River Suir at King's Channel from time to time as overflow from the pumping station.
- Hydrological impact on saltmarsh habitat via increased freshwater influence from flood risk, increased surface-water discharge (including cumulative from other developments existing, proposed and in planning).
- Increased recreational use impacts on saltmarsh habitat (including cumulative from other developments existing, proposed and in planning).

2.Description of the development site and project

2.1 Brief description of the site location and project

The study site, encompassing 9ha (study site and off-site proposed surface water and foul sewer works), is located in the environs of Waterford City, approximately 5km east of the city centre. The study site is situated on the edge of a predominately residential/suburban landscape with extensive mixed agricultural farmland extending to the east, south and south east (*i.e.* urban fabric, agricultural areas; arable and pasture (CORINE 2018; www.gis.epa.ie/).

The existing study site (2019) is comprised predominately of a large/open currently fallow arable crop field (BC1, after Fossitt 2000). Semi-natural hedgerows (WL1) comprised of typical native species (*e.g.* Bramble *Rubus fruticosus* agg., Gorse *Ulex europaeus*, Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra),* are primarily located along the study site boundaries to the south, east and north east, with just one hedgerow (WL1) crossing through the study site (*i.e.* running north to south through the study site) towards the eastern boundary. One non-native treeline (WL2) (*i.e.* Monterey Cypress *Cupressus macrocarpa* (Cupressaceae)) is present on part of the southern boundary, where it appears to be the property of the neighbouring church and graveyard. Since earlier site visits one section of this treeline (WL2) has since been felled and removed and more recently (Since October 2018) a further section of this treeline (WL2), situated along the eastern boundary between the grave yard and study site has also been felled, with the mature felled trees still lying where the fell (off-site/on graveyard property) in March (2019). Concrete post and rail fencing (buildings and artificial surfaces BL3) with occassional trees and rank grassy verge (GS2) is situated along the western boundary of the study site. There is an area of immature woodland (WS2) on the northern boundary, extending north and off site from here, with young/immature stands of mixed native and non/native species (e.g. Ash *Fraxinus* excelsior, Willows (*e.g.* Grey Willow *S. cinerea*, *Salix cinerea* spp. *oleifolia*), Silver Birch *Betula pendula*, Oak *Quercus robur*, Beech *Fagus sylvatica*, Maples *Acer* species and Pines *Pinus* species. One section of hedgerow (WL1) *c.* 148 linear m will be removed to accommodate the residential development footprint, with all remaining hedgerows (WL1) present along the boundaries of the site maintained, enhanced and incorporated into the final landscaped masterplan for the development (See Chapter 5 Biodiversity of EIAR and Landscape Masterplan drawing number 101). One section of immature woodland (WS2) will also be removed, however all remaining woodland (WS2) extending off site will be maintained with additional new woodland/tree planting proposed as part of the landscaping masterplan for the development.

Overall based on a biodiversity study and impact assessment undertaken as part of this planning application the study site is currently considered to be of low to higher local importance, as it supports semi-natural hedgerows and modified habitats with local wildlife/biodiversity value (refer to Chapter 5 of the Environmental Impact Assessment Report (EIAR) accompanying this SHD application).

While there are no known watercourses associated with the proposed development site, it is situated within the River Suir Catchment and is part of the South Eastern River Basin District (RBD). The Lower River Suir Estuary (Little Island to Cheekpoint)- a transitional waterbody, is of moderate status (2010-2015; Water Framework Directive WFD Status, www.epa.ie). Based on a review of the EPA online database The Lower River Suir Estuary (Little Island to Cheekpoint) has a moderate biological status, good chemical SW status, with a moderate nutrient status but may be at risk of not achieving/maintaining this status. General and hydromorphological parameters are also described as good, (epa.ie/EPAMaps/). Downstream the Barrow Suir Nore Estuary is of good status overall and not at risk of maintaining this WFD status. The nearest watercourses identified as part of a desktop review, include the Halfway House and Blenheim streams (gis.epa.ie). The Halfway House stream is located *c*. 1.4km to the east of the residential study site and as the site slopes from south to north it is unlikely that this stream receives drainage from the proposed study

site. Blenheim stream is also located to the east of (*c.* 600m), where it flows north before discharging to the River Suir at King's Channel. Where Blenheim stream flows to the east of the proposed development site, it is uphill and as such is unlikely to receive drainage from the site, however, a small freshwater tributary of Blenheim Stream, which is downstream of the study site, will ultimately receive controlled surface water drainage from the proposed development, through new connections with an existing local public sewer located on Dunmore Road (R683), and as such a potential indirect hydrological link exists between the proposed development site and the Lower River Suir SAC and downstream River Barrow and River Nore SAC. The proposed waste-water/effluent drainage will connect with existing public sewers which transfers waste-water/effluent drainage to Waterford City WWTP via Island View Pumping station which has a combined SWOs outfall into the River Suir at King's Channel; this outfall discharge point is located within the Lower River Suir SAC (see Figure 1). Due to the location of this outfall a potential indirect hydrological link exists between the proposed development site and The Lower River Suir SAC and downstream River Barrow and River Nore SAC.

2.2 Brief description of the proposed project

The proposed development will consist of the construction of 361 no. residential units at Knockboy, Waterford, together with all associated site works and services (*e.g.* vehicle and pedestrian access, landscaping *etc*.). While the proposed development study site is comprised primarily of the proposed residential area this development will include works to accommodate new connections to an existing public waste-water/effluent sewer associated with the nearby Island View pumping station and off-site construction of new surface water drainage infrastructure, that will ultimately connect to an existing public drainage network on Dunmore Road (R683). which ultimately discharges to the Lower River Suir via a freshwater tributary of Blenheim Stream.

When the study site connects to the existing public foul sewer network waste water/foul effluent drainage arising from the proposed development site will discharge to this network for transfer and treatment at Waterford City Wastewater Treatment (WWTP) at Gorteens, which ultimately discharges to the River Suir. Prior to the transfer to the WWTP this local authority drainage infrastructure transfers waste-water/effluent drainage to Island View pumping station, where it is subsequently pumped onwards to the WWTP. Island View pumping station has a combined sewer overflow (CSO) and emergency overflow (EO) system (collectively surface water overflows SWOs, after RPS 2019, see Appendix B of NIS), which when triggered occasionally (by excess surface water ingress), discharges to the Lower River Suir Estuary at Little Island/King's Channel. Due to the location of the SWOs raw sewage discharges from time to time as overflow from Island View pumping station. As the waste-water/effluent associated with the proposed development at Knockboy is directed into the public sewer network, including Island View pumping station, there is the potential for raw sewage associated with the proposed development would be part of the overflow at the SWOs. However, it is important to note here, that the design of the surface water drainage infrastructure is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs. In other words, the frequency of raw sewage discharge through the existing SWOs at King's Channel will not be triggered by surface water discharge from this proposed development.

Construction and Operational Phases

Construction works for the proposed development will consist of the construction of 361 no. residential units which will involve initial stripping of soils and excavation of subsoils within the footprint of the proposed residential units and associated hard standing infrastructures. There are no watercourses on site that could carry siltation/contamination directly downstream to the River Suir. Standard best practice environmental controls (*i.e.* soil and water management proposals as present in the EIAR and accompanying documents) to protect the surrounding environment will be implemented during

construction to minimise any potential risk of surface and/or groundwater pollution through, siltation, nutrient release and/or contamination (see oCEMP submitted as part of this application, Chapters 6 and 7 of the EIAR, Engineering Planning Report MAL 2019a and supporting documents). The construction management plans will be reviewed/updated and agreed accordingly on appointment of the contractor prior to construction works starting. All construction staff will be made aware of the environmental protection measures/mitigations to be implemented for the site during construction. While primarily designed to address environmental risks associated with construction works at the residential development site, these standard best practice environmental controls, will also serve to minimise potential construction phase run-off impacts into the wider environment including the River Suir (and Lower River Suir SAC and downstream River Barrow and River Nore SAC), even if this is not the primary aim of these measures.

During initial construction works and before the residential site is connected to the public sewer network, construction phase waste-water/foul effluent will be managed at a temporary site compound (*i.e.* site portaloos and welfare units in accordance with the CEMP), with all foul waste removed from site by licenced waste disposal contractors. As standard; a site compound with staff welfare facilities and designated fuel and waste storage areas will be in place during the period of construction. The construction works will not require any further resources (*i.e.* land-take, water abstraction) from the surrounding environment and will be completed in compliance with standard best practice.

Once initiated during the construction phase, water supply, controlled surface water drainage and waste-water/foul effluent drainage will discharge to the public networks as described in more detail below.

During the operational phase while there will be additional residential activity at the proposed development site, the proposed residential development/site study site is not within the boundaries of the Lower River Suir SAC and/or River Barrow and Nore SAC and there will be no additional resource requirements from the surrounding environment, with the exception of water supply and surface/storm water and foul water drainage to and from the residential homes, which will be provided via new connections to existing local authority services.

The engineering planning report (MAL 2019a) details the proposed water supply, surface water drainage and waste-water/effluent proposed for this residential development.

Water Supply

Once initiated the construction and operational phase of the proposed development will connect through new services to the local authority/Irish Waters' water supply serving Waterford City (in accordance with requirements of the local authorities). The East Waterford Water Supply Scheme at Adamstown, Kilmeadan, supplies drinking water to Waterford City. A recent extension to this plant (2010) increased the production capacity to 52,000 m^3 per day. This new reservoir and water tower at Bawndaw (2010) has increased the storage capacity for Waterford City by *c.*22% (WCC 2013 – 2019a). It is understood that the water infrastructure investments are sufficient in securing the water supply, quantity and quality to Waterford City's into the future (WCC 2013 – 2019a). In addition, works have also progressed on a Water Conservation Programme for Waterford City, including mains rehabilitation and active leakage control. Both Phase 2 and Phase 2A of the water mains rehabilitation programme were completed in 2010 and to date has led to considerable improvements in water pressures, leakage reduction and water quality throughout the City. The proposed development at Knockboy will connect to the local authorities' water supply serving the City (in accordance with requirements of Irish Water). It is understood that the proposed connection to the Irish Water distribution network can be facilitated (please refer to Irish Water correspondence as submitted as part of this planning application pack; MAL 2019a).

Surface Water Drainage

Once initiated the proposed discharge of surface water drainage from the residential development (construction and operational) is to an existing surface manhole, which is located within the existing carriageway at Dunmore Road and which discharges to a tributary of Blenheim freshwater stream (FW1 after Fossitt 2000), which ultimately discharges to the Lower River Suir estuary at King's Channel, to the north of Dunmore Road (Figure 2).

Agreements have been reached with the local Planning Authority to provide separate new surface water infrastructure to carry restricted/controlled discharge from the proposed development before connecting with the existing local authority manhole at Dunmore Road. The local authority has also requested that this new surface water sewer be of adequate size to take the runoff from the proposed development together with the greenfield runoff from all currently zoned lands upstream of the proposed development site (MAL 2019a). The surface water drainage infrastructure has been designed with reference to the Greater Dublin Strategic Drainage Study (GDSDS) with standard environmental controls including; controlled run-off rates, surface water attenuation, SuDS and flow control; providing for 100-year storm events, swales, surface water infiltration and permeable paving (see MAL 2019a). Flooding or Floodplain impacts are not considered relevant here as the study site is not at risk of fluvial flooding and the proposed surface water drainage system is designed such that it will not contribute to any possible flooding to downstream lands (MAL 2019b). While the proposed surface water management will be specific to the study site development and the River Suir, it will also minimise any potential run-off impacts to the wider environment, including the Lower River Suir SAC and River Barrow and River Nore SAC.

Of note, the design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs at Island View pumping station Furthermore, the surface water discharge point is to a small fresh water tributary of Blenheim stream associated with terrestrial vegetation (*i.e.* trees and scrub), *c.* 601m upstream (direct overland) of the brackish and saline saltmarsh habitats associated with this part of the Lower River Suir SAC.

Foul Water Drainage

As outlined in the previous Waterford City Development Plan, the development and upgrade of Waterford City's wastewater drainage and treatment system was considered vital to ensure the future sustainable development of the City and to improve overall water quality (EPA documented status) across the area (WCC 2013-2019a). Significant drainage and wastewater treatment upgrades have been completed during the lifespan of the last City Development Plan (*i.e.* prior to WCC development plant 2013-2019), including; Phase 2 of the Waterford Main Drainage scheme which was completed in 2010. This scheme entailed (WCC 2013-2019a):

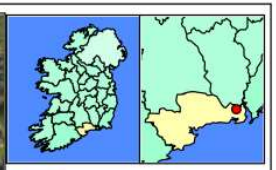
- Provision of a new Wastewater Treatment Plant WWTP at Gorteens, Co. Kilkenny, providing for the preliminary, primary and secondary treatment of the city's wastewater before discharge to the River Suir.
- The transfer of the City's wastewater via collector sewers, pumping stations and rising mains along the southern and northern side of the River Suir, to collect and deliver wastewater to this new WWTP for treatment.

The new WWTP at Gorteens became fully operational in 2010. The plant has a design population equivalent of 190,600 which caters for the existing Waterford City Development Plan (2013 – 2019) - (47,000) and the predicted future City population (68,600). Based on the lands zoned for housing development in the Development Plan (2013–2019), it is considered that the WWTP is more than adequate to accommodate this projected demand (WCC 2013 -2019a).

Once initiated all waste-water foul/effluent drainage for the construction and operational phases of the proposed development will connect with and discharge to the local authority foul waste drainage sewers through new connections located close to the site, for transfer and treatment at Waterford City WWTP, which ultimately discharges to the River Suir and as such The Lower River Suir SAC. Waterford City WWTP is currently compliant with regard to its licensed emissions, where its discharge is not having an observable negative impact on water quality or Water Framework Directive (WFD) status of the receiving waters of the River Suir/associated designated sites (see Irish Water 2018). Furthermore, Waterford WWTP currently has significant capacity to accept the additional organic PE loading arising from this proposed development (see Irish Water 2018); where Irish Water has also verified that the foul connection to the public network and associated WWTP can be accommodated (please refer to Irish Water correspondence as submitted as part of this planning application pack).

Prior to the transfer to the Waterford City WWTP this local authority drainage network transfers waste water/effluent drainage to Island View pumping station, where it is subsequently pumped onwards to the WWTP. As described earlier, Island View pumping station has a combined sewer overflow (CSO) and emergency overflow (EO) system (collectively surface water overflows SWOs, after RPS 2019), which when triggered (by excess surface water ingress), discharges to the Lower River Suir Estuary at Little Island/King's Channel. Raw sewage discharges on occasion as overflow from Island View pumping station via the SWOs at King's Channel on the River Suir (and associated designated sites). As the waste-water/effluent associated with the proposed development at Knockboy is directed into the public sewer network, including Island View pumping station, there is the potential for raw sewage associated with the proposed development would be part of the overflow at the SWOs. Of note here, is the fact that the design of the surface water drainage infrastructure is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs. In other words, the frequency of raw sewage discharge through the existing SWOs at King's Channel will not be triggered by surface water discharge from this proposed development.

All other wastes associated with the construction and operational phases of the development will be managed and removed from site by approved/licensed operators as standard, in line with construction and domestic waste management regulations.



Lower River Suir SAC Boundary

Indicative Location of Public Surface/Storm Water Discharge Point

Figure	2
Title	Public Surface/Storm Water Discharge Point
Client	Jackie Greene Construction
Project	Residential: Knockboy, Waterford
Date	13.08.18
Drawn	KMK
Scale	1:4,500 @ A4
Map Licence	Bing - see map

KELLEHER ECOLOGY SERVICES

Dr Katherine Kelleher.
Curraghdermot, Castlelyons, Co. Cork.
086 8677932
info@kelleherecologyservices.ie

3. Methodology

This NIS was completed following a desktop review, reference to guidelines, a series of field assessment and saltmarsh habitat survey as detailed below.

3.1 Desktop sources and guidelines reviewed

The following desktop sources were reviewed to inform this NIS:

- Online data available on Natura 2000 sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie.
- Online data available for local watercourse and transitional waterbodies held by the Environmental Protection Agency (EPA) from www.epa.ie.
- Planning Application supporting documents including the Environmental Impact Assessment Report (EIAR) and associated standalone reports.
- A Surface Water Overflow (SWOs) water quality assessment report produced by RPS (2019)
- A relevant online literature review
- Waterford County Development Plan (2013 – 2019)
- Aerial photography

The following guidelines were referred to in the completion of this assessment;

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – European Commission Methodical Guidance on the provisions of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (European Commission 2001).
- Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. Commission Notice (European Commission 2018).
- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DoEHLG 2009).
- Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioner's Manual (EPA 2013).
- European Court of Justice Opinion 22nd November 2012 by Advocate General Sharpston; Case C-258/11 Peter Sweetman and Others v An Bord Pleanála – in determining whether a project or plan has an adverse effect on the integrity of a site (to which Article 6(3) of Council Directive 92/43/EEC applies), an effect which is permanent or long lasting must be regarded as an adverse effect.
- European Court of Justice Judgement 11th April 2013 by the Third Chamber; Case C-258/11 Peter Sweetman and Others v An Bord Pleanála - criteria to be applied when assessing the likelihood that a project or plan (N6 Galway City Outer Bypass road scheme in this case) will adversely affect the integrity of a Natura 2000 site (Lough Corrib SAC in this case), where the integrity of a Natura 2000 site is considered to be adversely affected if a plan or project is liable to prevent the lasting preservation of the constitutive characteristics of the site that are connected to the presence of a priority natural habitat whose conservation was the objective justifying the designation of the site.
- High Court Ruling 25th July 2014 by Ms. Justice Finlay Geoghegan; Neutral Citation [2014] IEHC 400; High Court Record No. 2013 802 JR; Kelly -v- An Bord Pleanála – judicial review of grant of planning by An Bord Pleanála for two wind farm phases in County Roscommon, including failure of ABP to carry out lawful appropriate assessment and giving reasons for its determination.
- High Court Ruling 24th November 2014 by Mr. Justice Hedigan; Neutral Citation [2014] IEHC 557; High Court Record No. 2014 320 JR; Rossmore Properties Limited & Anor -v- An Bord Pleanála – where mitigation measures are an intrinsic part of a project, they may be taken into account in the stage 1 screening process.

- High Court Ruling 25th February 2016 by Mr. Justice Barton; Neutral Citation [2016] IEHC 134; High Court Record No. 2013 450 JR; Balz & Heubach -v- An Bord Pleanála - recording complete definitive and precise findings, and conclusions re Appropriate Assessment.
- European Court of Justice Judgement 12th April 2018 by the Seventh Chamber; Case C 323/17; People Over Wind & Sweetman -v- Coillte Teoranta - it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on a Natura 2000 site.
- European Court of Justice 19th April 2018; Case C 164/17; Grace & Sweetman -v- An Bord Pleanála – a measure compensating for the negative effects of a project cannot be taken into account in an Appropriate Assessment Natura Impact Statement (Stage 2).
- European Court of Justice 7th November 2018; Case C 461/17; Holohan & Others v. An Bord Pleanála - all the habitats and species for which the Natura 2000 site is protected must be catalogued; an Appropriate Assessment must identify and examine the implications of the proposed project for species present on the Natura 2000 site, including species for which the site has been listed and those for which it has not, provided those implications are liable to affect the conservation objectives of the site; an Appropriate Assessment must identify and examine the implications of the proposed project for species and habitats outside the boundaries of the Natura 2000 site, provided those implications are liable to affect the conservation objectives of the site.; the competent authority may grant consent for a plan or project that leaves for later decision the determination of certain parameters relating to the construction phase if the competent authority is certain (i.e. 'no reasonable scientific doubt) that the development consent granted establishes conditions that are strict enough to guarantee that those parameters will not adversely affect the integrity of the site.
- High Court Ruling 2nd February 2019 by Mr. Justice Barniville; Neutral Citation [2019] IEHC 84; High Court Record No. 2017 883 JR; Kelly -v- An Bord Pleanála & Anor- SUDS are not mitigation measures which a competent authority is precluded from considering at the stage 1 screening stage.

3.2 Ecological Assessments

The overall field assessments comprised of walkovers at the proposed development study site and an Atlantic Salt Meadow survey at/near the existing SWOs that discharges into the River Suir and associated SAC at King's Channel (as outlined above).

A series of field surveys including habitat and flora, hedgerow appraisal, birds, mammals (non-volant), bats and other taxa were undertaken at the proposed development study site since October 2018 to inform both the Environmental Impact Assessment Report (EIAR) and NIS associated with this planning application.

In terms of the NIS, the primary objective of the site walkovers was to gain an overview of the study site as well as to note ecological points of interest such as the presence of habitats/species that are protected or are qualifying interests of the Natura 2000 sites relevant here (as outlined in Section 4 below).

The study site does not currently support habitats or fauna that are qualifying interests of the Natura 2000 sites under consideration here and/or are of ex-situ ecological value for such qualifying interests. The proposed new surface water sewer area of the site is dominated by existing modified habitats such as roads, footpaths and amenity grassland; such habitats are of no to low ecological value.

3.2.1. Atlantic Salt Meadow ASM Assessment (at/near the existing combined outfall at King's Channel)

To inform this NIS a field assessment was undertaken of Atlantic Salt Meadow 1330 (saltmarsh) present at/near the existing SWOs that discharges on occasion into the River Suir and associated SAC at King's Channel. Atlantic Salt Meadow 1330 is one of the qualifying interests of the Lower River Suir SAC and is situated near to the SWOs outfall location. As highlighted in Sections 2.2 above, raw sewage overflow from

the nearby Island View pumping station that discharges via the SWOs has been cited as a potentially relevant impact in relation to Atlantic Salt Meadow 1330 present nearby.

Atlantic Salt Meadow 1330 present in the vicinity of the aforementioned combined SWOs has previously been assessed in 2007 as part of the national based Saltmarsh Monitoring Project (SMP), where it partly overlapped the relevant SMP site at Little Island (see McCorry and Ryle 2009a&b). This presented an opportunity to compare the existing situation regarding ASM 1330, with the historical situation from 2007 and thereby assess changes and/or impacts on ASM 1330 here including raw sewage release via the combined SWOs potentially relevant here. The field surveys were completed on or around low tide; between 15.00 pm and 20.00 pm on the 26th of June and between 10.00 am and 13.00 pm on the 11th of July 2018.

3.2.2. Background to SMP Monitoring Project

The Little Island Atlantic Salt Meadow 1330 subsite of the Lower River Suir SAC (NPWS, 2017) is described as 'as being confined to the mainland, where it is relatively narrow in parts and where its landward succession is limited by historic earthen embankment works (McCorry and Ryle 2009b). The Little Island ASM sub-site was mapped into three monitoring areas as part of the SMP (2007 - 2008), described as 'not extensive' and while Atlantic Salt Marsh 1330 was considered the dominant saltmarsh habitat (2007) it is 'often overwhelmed by brackish vegetation with large stands of Reeds' (McCorry & Ryle 2009a). The SMP project sub-divided the overall Little Island saltmarsh area into three sub-sites that were not extensive, where the area near the combined outfall coincides with the Grantstown Townland sub-site (see McCorry and Ryle 2009b). This subsite forms part of a wider saltmarsh area, where up to 33.43ha have been mapped as potential Atlantic Salt Marsh 1330 for the Lower River Suir SAC (NPWS, 2017).

The SMP project also noted historic damage from development and pipe-laying (such as the loss of the Flora (Protection) Order 2015 plant species Meadow Barley *Hordeum Secalinum*), as well as part of the SMP Little Island Atlantic Salt Meadow site being likely affected by sewage discharge (see McCorry & Ryle 2009a & 2009b). The development in question included housing, while pipe-laying related to the installation of a new public sewer network as part of Phase 2 of the Waterford Main Drainage scheme at the time (which was commissioned from 2010) including the current Waterford City WWTP at Gorteens, Co. Kilkenny; see WCC 2013a).

Sewage discharge noted by the SMP project in 2007 comprised of raw sewage flowing within a drainage channel that passed through a large stand of Common Reed *Phragmites australis* before discharging into King's Channel. It is important to note that this historic management of sewage here has since been superseded by the Waterford Main Drainage scheme commissioned from 2010 (see WCC 2013a) where raw sewage locally now only comprises of occasional overflow from the nearby Island View pumping station that currently discharges directly into King's Channel via the aforementioned combined SWOs and not via a drainage channel with associated saltmarsh habitat. Likely sewage discharge affects noted at this small part of the saltmarsh in 2007 included saltmarsh enrichment that 'may' have resulted in the dominance of Common Reed at the expense of Sea Rush *Juncus maritimus* and ranker Atlantic Salt Meadow adjacent to the sewage discharge point associated with the aforementioned drainage channel (see McCorry & Ryle 2009b). While the 'likely' effect of nutrient enrichment arising from sewage discharge present in 2007 was the main reason that the structure and functions of Atlantic Salt Meadow here were assessed as *unfavourable-inadequate* at the time, it was also acknowledged that no significant negative impact from sewage discharge occurred in relation to the structure and functions of the Atlantic Salt Meadow habitat in question (McCorry & Ryle 2009b). In terms of future prospects and recommendations in relation to Atlantic Salt Meadow habitat in 2007, the continuation of sewage discharge and investigation of same was highlighted (McCorry & Ryle 2009b). As mentioned above, Phase 2 of the Waterford Main Drainage scheme

has since been completed (2010) including the commissioning of the current Waterford City WWTP at Gorteens, Co. Kilkenny (see WCC 2013a).

3.2.3. Atlantic saltmarsh assessment 2018

As far as possible the field survey and key attributes assessed were completed with reference to the methodologies presented in the SMP 2007 – 2008 (SMP) (McCorry & Ryle, 2009a) and with reference to the attributes for Atlantic Salt Marsh 1330 habitat as presented in the conservation objectives supporting document (NPWS, 2017). The 2007 SMP field assessments where completed using a combination of visual inspections/best judgement, three 10 x 10 m monitoring stops and three 2 x 2 m quadrats. It is important to note that the 2018 field assessment here did not seek to replicate the SMP methodology as such, since the SMP study was based at a much larger national scale objective than the relatively local scale objective required here. The study area for the survey undertaken in 2018 was defined according to the baseline habitat maps produced as part of the SMP project in relation to Grantstown Townland sub-site (see Figure 1).

The 2018 field assessment involved a walkover of the Atlantic Salt Meadow study area where attributes such as habitat area, physical structure; creeks and pans, vegetation structure; zonation, typical species (*i.e.* Atlantic Salt Meadow ASM 1330 indicator species) and occurrence/abundance of the negative indicator Common Cordgrass *Spartina anglica* were considered (adapted after McCorry & Ryle 2009a and NPWS 2017). Changes in attributes such as habitat area and physical structure of creeks and pans was examined by a visual assessment in the field and comparing recent aerial photography with baseline habitat mapping produced by the SMP project datasets (see McCorry & Ryle 2009a&b). Where possible, signs of point pollution were examined through a visual inspection of the habitats surrounding the SWOs discharge location, immediate area up/downstream of this outfall discharge location and along the nearby tidal creeks and pans connected to King's Channel.

Quadrats were also undertaken as part of the 2018 assessment to record the vegetation structure through height, percentage cover and vegetation composition (details below). A total of three 2 x 2m quadrats were undertaken, which were referenced as Western, Middle and Eastern (see Figure 1 and Table 3.1).

2018 Quadrat Site	Quadrat Grid Reference 2018
WESTERN	S 64289 10347
MIDDLE	S 64396 10268
EASTERN	S 64872 10424

Table 3.1 Locations of 2x2m quadrats included in the 2018 field assessment.

Plate 1, 2 and 3. Quadrat location photos for Little Island eastern 3, middle 4 and western 5 sections/sub-sites of Atlantic Salt Marsh 1330. The western quadrat (plate 3) was completed at the edge of the successional FS1 habitat/ Class 6: Brackish swamps and residue habitat


N
0
50
METRES
Eastern
Western
Middle
© 2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018) Distribution Airbus DS
Lower River Suir SAC Boundary
Outfall Location
Atlantic Salt Meadow Study 2018:
Study Area Boundary
Quadrat Locations
Saltmarsh Monitoring Project 2007:
Atlantic Salt Meadow Area
Quadrat Locations (approximate)
Figure 1
Title Atlantic Salt Meadow Study Area 2018
Client Jackie Greene Construction
Project Residential: Knockboy, Waterford
Date 13.08.18
Drawn KMK
Scale 1:3,200 @ A4
Map Licence Bing - see map
KELLEHER ECOLOGY SERVICES
Dr Katherine Kelleher.
Curraghdermot, Castlelyons, Co. Cork.
086 8677932
info@kelleherecologyservices.ie

The quadrats were located as close as possible to the 2 x 2m quadrats locations undertaken by the SMP project in 2007. The western section of the study area has been subject to ongoing succession by Common Reed (reed and large sedge swamp FS1 after Fossitt 2000 or Class 6: brackish swamps and residue after Devaney and Perrin 2015). A large stand of Common Reed has been present here since 2005 and has extended northward towards the shoreline (based on aerial photography 2000-2005 OSI, 2009 Google maps and 2018 Bing mapping), where it has overwhelmed part of the previously mapped Atlantic Salt Marsh 1330 habitat (as mapped by the SMP project). A quadrat was therefore undertaken for the 2018 field assessment as near as possible to the SMP quadrat location, along the edge of this Common Reed stand (see Figure 1, Plate 3); it is nonetheless considered that this alternative location documents the key Atlantic Salt Meadow 1330 indicator species present in the remaining Atlantic Salt Marsh area. Data recorded for each quadrat included; the plant species present, range of percentage cover of each plant species (*i.e.* 1 -100% bands with reference to the DOMIN scale), bareground (percentage cover) and sward height (cm). The presence and percentage cover of the negative indicator species *Spartina anglica* was also recorded. Each of the quadrats where photographed (see Plate 1, 2 and 3 above) and the grid location noted using had held GPS units (+/- 4m accuracy; see Table 3.1).

The data collected during the 2018 field assessment was collated and compared to the SMP dataset where appropriate, to assess potential changes and/or impacts on Atlantic Salt Meadow 1330 per the relevant attributes/targets as outlined in the conservation objectives for the Lower River Suir SAC (see NPWS 2017).

3.2.3.1 Results; Atlantic Salt Meadow Assessment 2018

This section outlines the results obtained during the Atlantic Salt Meadow surveys, in comparison with the SMP results and in conjunction with the attributes for Atlantic Salt Meadow 1330 as presented by NPWS (2017).

Atlantic Salt Meadow Extent

Based on the site surveys 2018 and on comparison with baseline habitat mapping results from the SMP, there has been a change in habitat area between years, with a reduction in two areas of Atlantic Salt Meadow 1330. This reduction in area appears to be as a result of natural tidal erosion along the narrow coastal band of saltmarsh (associated with the historic tall coastal flood defence embankment/land reclamation, Plate 4 below) and ongoing succession to reed and large sedge swamp (FS1) (after Fossitt 2000), or Class 6 brackish swamps and residue (after Devaney and Perrin 2015) at the western section of the study area.

Common Reed is frequent on the existing earthen embankment and part of the reclaimed land and drain immediately adjacent to the study area, with one small stand of Common Reed and occasional plants noted along the narrow coastal band of the Atlantic Salt Meadow 1330 study area. One area of Sea Club Rush *Bolboschoenus maritimus* is present within the Eastern section of the study area, however it is not clear if this stand was present in 2007. While changes in the extent of brackish reed can be influenced by freshwater inputs and nutrient status, brackish stands of Common Reed are also considered typical of estuarine saltmarsh systems, particularly in the upper part of the system where the saltmarsh meets higher ground and the natural upper estuarine saltmarshes transition to fresh-water or tidal/brackish wetlands (Boorman 2003, JNCC 2004). Furthermore, changes in sea level in relation to natural events, or a change in land levels and/or climate change, can lead to a loss in area of saltmarsh, which has been documented in the UK where the process of coastal squeeze (as a result of historic man-made development), isostatic adjustment and sea level rise have been shown to limit halophytic vegetation with an overall adjustment of plants and communities to the new ground levels (Boorman 2003). Saltmarsh is considered a naturally dynamic system that exhibits cycles of natural erosion and accretion and succession to other habitats

(Devaney and Perrin 2015). In intact saltmarsh habitat (not impacted by coastal squeeze) pioneer, lower, middle and higher saltmarsh zones are seen as a successional series, being built up by sedimentation, then destroyed by erosion and followed by new accretion (UKTAG 2013). As saltmarsh develops the natural accumulation of sediment can raise the level of the marsh in relation to the sea which naturally reduces the duration and frequency of tidal inundations, allowing other species establish and as such different vegetative communities may gradually develop (Boorman 2013).

In this case, no significant change in saltmarsh structure (such as an increase in brackish reed species, Common Reed and Sea Club Rush) at or immediately adjacent to the combined outfall at King's Channel or along the lower sections of the tidal creeks and pans linked to King's Channel was noted in 2018 to suggest that occasional nutrient inputs from raw sewage overflow associated with Island View pumping station via the SWOs (point pollution) is driving succession at the Western section of the study area. In summary, it is thought that the successional increase of Common Reed stands at the Western section of the study area may be a result of coastal squeeze (associated with previous development works/land-use/land level change) along with freshwater/tidal estuarine environment combined with natural cycles of accretion leading to accumulation of sediments that has reduced tidal influence here.

Physical Structure

Based on the site walkovers (in 2018) and in comparison, with the SMP baseline habitat mapping (in 2007), there has been no apparent change in the physical structure of creeks and pans present. Some typical zonation between lower and mid-upper saltmarsh persists in parts, particularly along the Little Island Middle section. Newly established Sea Aster *Aster tripolium* and non-native *Spartina anglica* on lower, previously tidal eroded estuarine mud substrate, may indicate some small-scale accretion or re-stabilisation of pioneer species/lower saltmarsh, is occurring along the narrow coastal band associated with the existing embankment section (Plates 4 and 5). There has been no increase in bareground and no poaching of the Atlantic Salt Meadow 1330 areas between study years and, as documented in 2007, there is no grazing at the Little Island Atlantic Salt Meadow (Grantstown Townland sub-site) and as such the sward remains 'lush and rank' (see McCorry & Ryle 2009b). There has been no significant expansion in *Spartina anglica* swards noted since 2007. In fact, a narrow band of *Spartina anglica* situated along the narrow coastal area associated with the embankment section in 2007 (mapped as *Spartina* swards in 2007; see McCorry & Ryle 2009b) has since been eroded by tidal action (Figure 1.) and as such the overall percentage cover of *Spartina* swards appears to have been reduced in general at the study site.

Plate 4: Overview of erosion and some potential accretion along the narrow coastal band of saltmarsh at the study area, 2018

Plate 5. Overview of potential accretion of pioneer saltmarsh species (Sea Aster) on previously eroded estuarine mud substrate along the narrow coastal band of saltmarsh at Little Island sub-site of the Lower River Suir SAC.

Vegetative Composition

Based on a broad comparison of quadrat data between studies (*i.e.* 2007 & 2018) the vegetative composition of Atlantic Salt Meadow appears similar; with Common Salt Marsh Grass *Puccinellia maritima* dominant in the lower Atlantic Salt Meadow area (part of Little Island Middle section) and abundant Creeping Bent *Agrostis stolonifera* in parts of mid-upper Atlantic Salt Meadow (see Table 3.3). A similar assemblage of broadleaved herb species was recorded between studies, comprised predominately of Sea Arrowgrass *Triglochin maritima*, Sea Aster *Aster tripolium* and Sea Milkwort *Glaux maritima* (see Table 3.2). While there is potential for discrepancies between percentage cover estimates between study years and surveyors, in general there appears to be an overall increase in cover for these three broadleaved herb species (*e.g.* low overall percentage cover of Sea Aster in 2007, compared to a much higher percentage cover overall in 2018; see Table 3.2). As noted there has been a successional shift to reed and large sedge swamp FS1 (after Fossitt 2000) or Class 6 brackish swamps and residue (after Devaney and Perrin 2015) along the western section of the study area such that the quadrat data from 2018 is at a different location to 2007 (as outlined in Section 3.2.3. above); this 2018 quadrat was used to assess the vegetation composition of the remaining area of Atlantic Salt Meadow 1330 present where a comparison of key species present suggests there has been little change in the vegetation composition for the remaining Atlantic Salt Meadow 1330.

Species	% Cover Little Island – Western		% Cover Little Island - Middle		% Cover Little Island - Eastern	
	2007	2018	2007	2018	2007	2018
Agrostis stolonifera	31 - 40	51 - 60	2 - 5	6 - 10	41 - 50	11 - 20
Puccinellia maritima			76- 100	91 - 100	21 - 30	11 - 20
Triglochin maritima	6 - 10	11 - 20	2 - 5	2 -5	<1	31 - 40
Atriplex portulacoides	<1		<1	<1	<1	
Aster tripolium	2 - 5	11 - 20	<1	6 - 10	6 - 10	11 - 20
Cochleria anglica	<1					
Glaux maritima	<1		<1	1 - 5	<1	4 - 10
Festuca rubra	6 - 10	41 -50				
Juncus gerardii			2 - 5			
Armeria maritima					2 - 5	
Plantago maritima				< 1		

Negative Indicators						
Spartina anglica	<1					<1

Table 3.2 Percentage cover of key Atlantic Salt Meadow plant species recorded in 2007 and in 2018 for Western, Middle and Eastern quadrat areas of the study area.

There were no visible signs of damage to vegetation (*e.g.* change in structure, vegetation composition, evidence of saltmarsh vegetation die-back or significant algal growth) at or near the existing SWOs at King's Channel or in along the associated tidal creeks or pans connected with Kings Channel (Plate 6 and 7). The existing SWos at King's Channel is located just to the east of the Middle survey area of the study area (see Figure 1 above). Saltmarsh is the dominant habitat surrounding the combined outfall, which comprises of other saltmarsh habitat (*e.g.* Twitch/Sea Couch grass dominated saltmarsh CM2; after McCorry and Ryle 2009b) immediately surrounding the inland side of the outfall location with Atlantic Salt Meadow 1330 (associated with the Middle section of the study area) adjoining the other saltmarsh CM2 habitat (see Figure 1 and Plate 6).

Plate 6. Overview of existing SWOs at King's Channel and associated saltmarsh CM2 inland.

There appears to be a small increase in the abundance of Twitch/Sea Couch grasses along the immediate coastline, extending slightly inland to the first small tidal creek, after which Atlantic Salt Meadow 1330 becomes dominant (Plate 8). On abandoned/ungrazed European saltmarsh, Sea Couch (that is considered as a late successional native species) has spread to become dominant in the saltmarsh habitat and as such replaced other saltmarsh communities (Devaney and Perrins 2015). Overgrazing pressure on saltmarsh along the west coast of Ireland may be the reason for the documented absence of this species (Preston *et al* 2002, after Devaney and Perrin 2015), suggesting that the level of site grazing influences the abundance and natural successional spread of Couch grasses and as such the successional spread of this species at Little Island Atlantic Salt Meadow study area may be a result of abandonment of any management practices.

Key Attributes

Based on the results obtained in 2018, there has been no apparent change to key attributes for Atlantic Salt Meadow (1330) habitat except for changes in area, which appears to be as a result of natural tidal erosion and succession to brackish/freshwater habitats; this is further summarised in Table 3.3 below.

Plate 7. Overview of typica l creek assessed for signs of pollution (*e.g.* change in structure, vegetation composition, evidence of saltmarsh vegetation die-back or significant algal growth)

Plate 8. Overview of change from other saltmarsh CM2 to Atlantic Salt Meadow 1330, at the first inland tidal creek, on the middle section of the sub-site.

Table 3.3 Summary of 2018 results in relation to the attributes for Atlantic Salt Meadow 1330 of the Lower River Suir SAC (after NPWS 2017).

Attribute (after NPWS 2017)	Measure (after NPWS 2017)	Target (after NPWS 2017)	Notes (after NPWS 2017)	2018 Assessment of Atlantic Salt Meadow (1330) Study Area
Habitat Area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the sub-site (Little Island) and potential areas mapped: 33.43ha).	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009). The sub-site, Little Island (SMP site ID: SMP0052) that supports Atlantic Salt Meadows (ASM) was mapped during the SMP (4.11ha) and additional areas of potential ASM habitat (29.32ha) were identified from an examination of aerial photographs, giving a total estimated area of 33.43ha within Lower River Suir SAC. **NB** further unsurveyed areas may be present within the SAC. (Rev. 1; 2017).	**Overall area has reduced but this reduction appears subject to natural processes, including erosion and succession.** Section of Atlantic Salt Meadow to the east, along a narrow extent of saltmarsh habitat associated with historic embankment has been subject to natural erosion processes (*i.e.* tidal actions). Area of Atlantic Salt Meadow within the western section of the sub site has decreased through succession to brackish reed and large sedge swamp FS1 - considered typical of an estuary saltmarsh with a freshwater influence.
Habitat Distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes.	Based on data from McCorry and Ryle (2009). Saltmarsh occurs on the River Suir estuary downstream of Waterford City in old flood meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing channels below Little Island. NB further unsurveyed areas may be present within the SAC. (Rev. 1 2017)	**Occurrence reduced but subject to natural processes, including erosion and succession.** Section of Atlantic Salt Meadow to the east, along a narrow extent of saltmarsh habitat associated with historic embankment has been subject to natural erosion processes (*i.e.* tidal actions). Area of Atlantic Salt Meadow within the western section of the sub site has decreased through succession to brackish reed and large sedge swamp FS1 - considered typical of an estuary saltmarsh with a freshwater influence.

Attribute (after NPWS 2017)	Measure (after NPWS 2017)	Target (after NPWS 2017)	Notes (after NPWS 2017)	2018 Assessment of Atlantic Salt Meadow (1330) Study Area
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details	**Creek and pan structure appear to have been maintained**. Historic embankment present - not considered in 2007 assessment. This may influence Atlantic Salt Meadow through associated coastal squeeze impacts.
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Little Island saltmarsh contains a well-developed topography and large, deep creeks are present. See the coastal habitats supporting document for further details	**Creek and pan structure appear to have been maintained**.
Physical structure; flooding regime	Hectares flooded, frequency	Maintain natural tidal regime	Based on data from McCorry and Ryle (2009). Much of the shoreline along the Lower River Suir channel has been modified by embankments, infilling and drainage. See the coastal habitats supporting document for further details topography and large, deep creeks are present. See the coastal habitats supporting document for further details	**No apparent change in physical structure since 2007**. Natural tidal regime may be influenced by historic embankment construction and/or associated coastal squeeze impacts.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). There are several saltmarsh communities present and zonation is moderately well-developed in the sub-site surveyed. The ASM transitions to grassland and freshwater habitats. This is typical of an estuary type saltmarsh with a significant freshwater influence.	**Some saltmarsh communities present and zonation is typical for the sub-site surveyed**. The Atlantic Salt Meadow also transitions to other saltmarsh (as described in 2007) and to brackish/freshwater FS1 habitats. This is considered typical of an estuary type saltmarsh with a significant freshwater influence.
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). As the sub-site is not grazed, the sward height	**As the sub-site is not grazed, the sward height is lush and rank in places.**

Attribute (after NPWS 2017)	Measure (after NPWS 2017)	Target (after NPWS 2017)	Notes (after NPWS 2017)	2018 Assessment of Atlantic Salt Meadow (1330) Study Area
			is lush and rank in places. However, the overall sward structure is still quite variable.	However, the overall sward structure is still quite variable.
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details	**Vegetation cover has been maintained at more than 90%. Bare soil is less than <25% across total Atlantic Salt Meadow study area.**
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain range of subcommunities with typical species listed in McCorry and Ryle (2009)	Typical species listed in McCorry and Ryle (2009)	Based on comparison between years, typical Atlantic Salt Meadow species are present.
Vegetation composition: Negative indicator species – *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1% where it is known to occur	Based on data from McCorry and Ryle (2009). Common Cordgrass (*Spartina anglica*) is present in the SAC, but swards are not a significant feature.	***Spartina* swards are not a significant feature of the study area. There has been a loss of area mapped as a *Spartina* sward in 2007 due to natural processes – tidal erosion.** *Spartina* cover is low overall with occasional plants in the Atlantic Salt Meadow sward in parts, some stands to the east and occasional new established *Spartina* stands on exposed mud - at low tide (*i.e.* accretion).

4. Brief Description of the Natura 2000 Sites

The residential area/footprint of the study site is not located within the boundary of any designated nature conservation site. The nearest designated sites (based on proposed residential development site and the associated (indirect) via the proposed surface drainage water public infrastructure to Blenheim Stream and effluent drainage public infrastructure/ via Island View pumping station) include; the Lower River Suir SAC which is located 0.569km from the proposed residential development study site, however due to the location of the public surface water discharge point on Dunmore Rd. and public sewer network associated with Island View pumping station the Lower River Suir SAC is located (indirectly) at 0.54km or 0km respectively. The River Barrow and River Nore SAC which is downstream/connected with The Lower River Suir SAC is located c.4.697km (direct overland) for the Study Site Boundary, > 5km km from the surface water discharge point on Dunmore Road, over > 5km downstream of the SWOs at Island View pumping station and c. 3.1 km downstream of the WWTP Discharge Point. Natura 2000 sites within 15km of the proposed development include; Lower River Suir SAC, River Barrow & River Nore SAC, Tramore Dunes & Backstrand SAC, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Hook Head SAC, Bannow Bay SAC and Bannow Bay SPA. There are no other sites greater than 15km away where a potential impact-receptor pathway is relevant.

4.1 Assessment of Likely Effects on Designated Conservation Sites

4.1.1. Overview of Potential Impact-Receptor pathways

Surface Water Discharge

There is a potential impact-receptor pathway via surface-water links between the development study site and two Natura 2000 sites; Lower River Suir SAC and River Barrow & River Nore SAC. The proposed discharge of controlled surface water from the development is to an existing surface water sewer manhole located within the existing carriageway at Dunmore Road (R684), which ultimately discharges to the Lower River Suir via a freshwater tributary of Blenheim Stream. Due to the proposed controlled surface water discharge location, there is a potential indirect hydrological link between the study site and two nearby designated conservation sites associated with the Lower River Suir Estuary (transitional waterbody), including; the Lower River Suir SAC, and the River Barrow and River Nore SAC. (see Table 4.1). Therefore, the potential for indirect hydrological impacts on these SACs via surface-water run-off arising from the study site are further considered in Section 5.1 of this report.

None of the other designated sites are downstream of the surface-water discharge point near Blenheim Stream and as such King's Channel and are therefore not considered relevant here due to a lack of hydrological link given their locations.

Waste-water/foul effluent discharge

A potential hydrological link also exists between waste water/effluent discharge from the study site and designated Natura 2000 sites within the River Suir/Lower River Suir Estuary transitional waterbody, including The Lower River Suir SAC and The River Barrow and River Nore SAC.

During initial construction works and before the residential site is connected to the public sewer network, construction phase waste-water/foul effluent will be managed at a temporary site compound (*i.e.* site portaloos and welfare units in accordance with the CEMP), with all foul waste removed from site by licenced waste disposal contractors. Therefore, no potential hydrological link from waste-water/effluent drainage arising during construction is relevant to any of the designated conservation sites under consideration.

When the study site connects to the existing public foul sewer network all waste water/foul effluent drainage arising from the study site (**construction and operational**) will discharge to this sewer network for transfer and treatment at Waterford City Wastewater Treatment (WWTP) located at Gorteens, which ultimately discharges to the River Suir and as such The Lower River Suir SAC. The River Barrow and River Nore SAC, is located downstream of the WWTP discharge point in question (c. 3.1km downstream).

Prior to waste-water/effluent the transfer to Waterford City WWTP, the local authority drainage infrastructure transfers waste water/effluent drainage to Island View pumping station, where it is subsequently pumped onwards to the WWTP. As described earlier, Island View pumping station has a combined sewer overflow (CSO) and emergency overflow (EO) system (collectively surface water overflows SWOs, after RPS 2019, see Appendix B of NIS), which when triggered occasionally (by excess surface water ingress), discharges to the Lower River Suir Estuary at Little Island/King's Channel. Due to the location of this SWOs discharge point there is a potential for indirect hydrological impacts, which in turn could impact on water quality and on associated nearby habitats (*e.g.* saltmarsh habitat; a subsite of Atlantic Salt Meadow ASM 1330 habitat located at the SWOs discharge point), including qualifying interests of the Lower River Suir SAC and downstream River Barrow and River Nore SAC. The potential for indirect hydrological impacts on the Lower River Suir and downstream River Barrow and River Nore SAC via waste-water/effluent drainage arising from the study site are further considered in Section 5 of this report.

None of the other designated sites are downstream of the discharge point from Waterford WWTP and Island View pumping station and are therefore not considered relevant here due to a lack of hydrological link given their locations.

4.1.2 Flooding/floodplain impacts

Flooding or floodplain impacts are not considered relevant here as the study site is not at risk of fluvial flooding and the proposed surface water drainage system is designed such that it will not contribute to any possible flooding to downstream lands (MAL 2019b).

4.1.3 Disturbance/Displacement of Key Fauna (*i.e.* listed as qualifying interests for designated sites)

The potential for disturbance and or displacement impacts through noise and or visual cues as a result of the proposed development on key fauna listed as qualifying interests of relevant designated sites also exists. Such disturbance/displacement impacts may also occur ex-situ where mobile fauna species associated with the designated sites move outside the designated site boundaries to forage/commute *etc*.

While the study site may provide some albeit limited forage habitat (*i.e.* fallow arable farmland), no key bird species (raptors, waterbirds) associated with the relevant designated sites were recorded during three dedicated bird transect surveys or as casual species during other field assessments at the study site. Taking seasonal constraints into consideration no suitable breeding habitat for key bird species exists within the study site. Furthermore, the study site is not immediately adjacent to or as such directly overlooking the relevant designated sites due to distances/landscape characteristics (*e.g.* Tramore Dune and Backstrand SPA and SAC c.6.667km, Mid-Waterford Coast SPA; 12.256km and Bannow Bay SPA c. 13.78km from study site). Therefore, disturbance/displacement impacts of key bird species associated with designated sites are not considered relevant.

In relation to The Lower River Suir SAC and River Barrow and River Nore SAC, faunal qualifying interests relate to aquatic species (*e.g.* Freshwater Pearl Mussel *Margaritifera margaritifera etc*.) and not terrestrial fauna species that may be vulnerable to disturbance or displacement impacts resulting from the proposed development. One potential exception to this is Otter, which uses for example river corridors, estuaries and associated nearby terrestrial habitats to commute, forage, rest and/or breed. Occasionally Otter can be found at a distance from the riparian/aquatic corridor (*e.g.* springtime abundance of prey such as frog in wetland

habitats such as ponds). However, in general Otter are primarily associated with the narrow, *c.*10m buffer, corridor along the riparian/aquatic interface (after NPWS from 2009/O'Neill 2008 unpublished). Whilst there is a general perception that Otter can be negatively affected by poor water quality, there has been little published evidence demonstrating any consistent relationship with pollution and Otter displacement. Similarly, there has been little published evidence demonstrating and consistent relationship between human disturbance and Otter displacement (Bailey & Rochford, 2006). Otter surveys carried out as part of an INTERREG wildlife Project by Waterford City and County Council 2011-2015 found abundant evidence of a strong Otter population along this section of the River Suir. Furthermore, a water quality assessment undertaken as part of this application (RPS 2019), show current/occasional discharge for island View pumping station is not impacting on water quality and any additional loadings associated with the proposed development will not adversely impact on the water quality status of the Lower River Suir and downstream designated sites (RPS 2019 see Appendix B). Therefore, given the habitat characteristics of the area included in the proposed development site, its location regarding the aquatic habitat areas associated with Otter, any loss, disturbance/displacement or fragmentation impacts are considered negligible and as such are not considered relevant here.

In conclusion, disturbance/displacement impacts of designated site fauna arising as a result of the proposed development are not considered relevant here with no further consideration of same in this NIS.

4.1.4 Recreational activity (*e.g.* walking, horse-riding, camping)

Recreational activities are recognised as one of the most common anthropogenic activities that can impact on saltmarsh habitat; a qualify interest of the Lower River Suir SAC, via erosion (see Devaney and Perrin 2015). Although it is also acknowledged that such tracks do not tend to cover large areas of saltmarsh and that the majority of amenity uses noted by the Salt Marsh Monitoring SMP (2007) project in relation to saltmarsh habitats (including Atlantic Salt Meadow 1330) were generally ranked as low intensity activities impacting negatively on small saltmarsh areas (see McCorry and Ryle 2009a).

In this case, no recreational activity was noted as an impact for the Little Island Atlantic Salt Meadow study area in 2007 (see McCorry and Ryle 2009a); while during further saltmarsh assessments completed in 2018 (as part of the NIS for this application), recreational associated tracks were only present at the Western section of the study area - along the SAC boundary edge, at other saltmarsh (CM2) and adjacent to terrestrial habitats (and not across or through the Atlantic Salt Meadow habitat of the study area as such). Furthermore, the proposed residential development at Knockboy does not include for any specific access to the Atlantic Salt Meadow areas. Therefore, recreational related impacts on the Lower River Suir SAC Atlantic Saltmarsh are not considered relevant here.

In summary, Section 5 of this NIS further considers potential potential construction/operational phase surface-water run-off impacts in relation to the Lower River Suir SAC and the River Barrow and River Nore SAC; and potential construction/operational phase waste-water/foul effluent impacts in relation to the Lower River Suir SAC and the River Barrow and River Nore SAC.

No potential impacts on the following Natura 2000 sites have been identified as a result of the proposed development; Tramore Dunes & Backstrand SAC, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Hook Head SAC, Bannow Bay SAC and Bannow Bay SPA. Therefore, it is objectively concluded that no significant effects arising from the proposed development are likely to occur in relation to these Natura 2000 sites; a Finding of No Significant Effect report for these Natura 2000 sites is available in Appendix A.

Table Error! No text of specified style in document.**.1 Natura 2000 Site Summary**

Natura 2000 Site & Site Code	Qualifying Interests & Conservation Objectives	Minimum Distance From Site Boundary & Discharge Points
Lower River Suir SAC 002137	The conservation objectives of this site relate to maintaining or restoring the favourable conservation condition of the following qualifying habitats and species (after NPWS 2017): • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • Mediterranean salt meadows (*Juncetalia maritimi*) • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • *Hydrophilous* tall herb fringe communities of plains and of the montane to alpine levels • Old sessile oak woods with Ilex and Blechnum in the British Isles • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) • *Taxus baccata* woods of the British Isles • *Margaritifera margaritifera* (Freshwater Pearl Mussel) • *Austropotamobius pallipes* (White-clawed Crayfish) • *Petromyzon marinus* (Sea Lamprey) • *Lampetra planeri* (Brook Lamprey) • *Lampetra fluviatilis* (River Lamprey) • *Alosa fallax fallax* (Twaite Shad) • *Salmo salar* (Salmon) • *Lutra lutra* (Otter)	<u>Site Boundary:</u> Over-land: 0.056km <u>Discharge Points:</u> Surface-water: 600m SWOs 0km Waste-water: 0km
River Barrow and River Nore SAC 002162	The conservation objectives of this site relate to maintaining or restoring the favourable conservation condition of the following qualifying habitats and species (after NPWS 2011a): • Desmoulin's whorl snail *Vertigo moulinsiana* • Freshwater pearl mussel *Margaritifera margaritifera* • White-clawed crayfish *Austropotamobius pallipes* • Sea lamprey *Petromyzon marinus* • Brook lamprey *Lampetra planeri* • River lamprey *Lampetra fluviatilis* • Twaite shad *Alosa fallax* • Atlantic salmon (*Salmo salar*) (only in fresh water) • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Salicornia and other annuals colonizing mud and sand • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • Otter *Lutra lutra* • Mediterranean salt meadows (*Juncetalia maritimi*) • Killarney fern *Trichomanes speciosum* • Nore freshwater pearl mussel *Margaritifera durrovensis* • Water courses of plain to montane levels with the *Ranunculion fluitantis* and C*allitricho-Batrachion* vegetation • European dry heaths • Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels • Petrifying springs with tufa formation (*Cratoneurion*) • Old sessile oak woods with Ilex and *Blechnum* in the British Isles • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	<u>Site Boundary:</u> Over-land: 4.537km <u>Discharge Points:</u> Surface-water: >5km SWO: >5km Waste-water: c.3.1km

Natura 2000 Site & Site Code	Qualifying Interests & Conservation Objectives	Minimum Distance From Site Boundary & Discharge Points
Tramore Dunes and Backstrand SAC 000671	The conservation objectives of this site relate to maintaining or restoring the favourable conservation condition of the following qualifying habitats (after NPWS 2013a): • Mudflats and sandflats not covered by seawater at low tide • Annual vegetation of drift lines • Perennial vegetation of stony banks • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • Mediterranean salt meadows (*Juncetalia maritimi*) • Embryonic shifting dunes • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • Fixed coastal dunes with herbaceous vegetation (grey dunes)	Site Boundary: Over-land: 6.66km Discharge Points: Surface-water: n/a Waste-water: n/a
Tramore Back Strand SPA 004027	The conservation objectives of this site are to maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (after NPWS 2013b): • Light-bellied Brent Goose (*Branta bernicla hrota*) • Golden Plover (*Pluvialis apricaria*) • Grey Plover (*Pluvialis squatarola*) • Lapwing (*Vanellus vanellus*) • Dunlin (*Calidris alpina*) • Black-tailed Godwit (*Limosa limosa*) • Bar-tailed Godwit (*Limosa lapponica*) • Curlew (*Numenius arquata*) • Wetland and Waterbirds	Site Boundary: Over-land: 6.66km Discharge Points: Surface-water: n/a Waste-water: n/a
Mid-Waterford Coast SPA 004193	The conservation objectives of this site are to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (after NPWS 2016): • Cormorant *Phalacrocorax carbo* • Peregrine *Falco peregrinus* • Herring Gull *Larus argentatus* • Chough *Pyrrhocorax pyrrhocorax*	Site Boundary: Over-land: 12.26km Discharge Points: Surface-water: n/a Waste-water: n/a
Hook Head SAC 000764	The conservation objectives of this site relate to maintaining the favourable conservation condition of the following qualifying habitats (after NPWS 2011b): • Large shallow inlets and bays • Reefs • Vegetated sea cliffs of the Atlantic and Baltic coasts	Site Boundary: Over-land: 13.26km Discharge Points: Surface-water: n/a Waste-water: n/a
Bannow Bay SAC 000697	The conservation objectives of this site relate to the following (after NPWS 2012a); • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Annual vegetation of drift lines • Perennial vegetation of stony banks • *Salicornia* and other annuals colonizing mud and sand • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • Mediterranean salt meadows (*Juncetalia maritimi*) • Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) • Embryonic shifting dunes • Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') • Fixed coastal dunes with herbaceous vegetation ('grey dunes')	Site Boundary: Over-land: 13.77km Discharge Points: Surface-water: n/a Waste-water: n/a

Natura 2000 Site & Site Code	Qualifying Interests & Conservation Objectives	Minimum Distance From Site Boundary & Discharge Points
Bannow Bay SPA 004033	The conservation objectives of this site relate to the following (after NPWS 2012b); • Light-bellied Brent Goose *Branta bernicla hrota* wintering • Shelduck *Tadorna tadorna* wintering • Pintail *Anas acuta* wintering • Oystercatcher *Haematopus ostralegus* wintering • Golden Plover *Pluvialis apricaria* wintering • Grey Plover *Pluvialis squatarola* wintering • Lapwing *Vanellus vanellus* wintering • Knot *Calidris canutus* wintering • Dunlin *Calidris alpina* wintering • Black-tailed Godwit *Limosa limosa* wintering • Bar-tailed Godwit *Limosa lapponica* wintering • Curlew *Numenius arquata* wintering • Redshank *Tringa totanus* wintering • Wetlands	Site Boundary: Over-land: 13.80km Discharge Points: Surface-water: n/a Waste-water: n/a

5. Assessment: Natura Impact Statement

5.1 Elements of the Project that may Potentially Impact on Qualifying Interests of the Natura 2000 Site

5.1.1 Key habitat loss

The proposed development site is not located within the boundary of any Natura 2000 and as such there will be no direct loss of key habitats or species associated with designated sites as a result of the proposed development and as such direct loss of habitat is not of concern.

5.1.2. Indirect Habitat Loss or Deterioration: Surface-Water Run-Off

Indirect habitat loss or deterioration of Natura 2000 sites (including water quality) within the surrounding area can occur from the effects of run-off or discharge into the aquatic environment through impacts such as increased siltation, nutrient release and/or contamination. This requires connectivity between the study site and the Natura 2000 sites in question through watercourses and/or drainage. This potentially applies to the River Suir where surface-water run-off associated with the development site will discharge, via new connections with the public sewer network at Dunmore Road, to a tributary of Blenheim Stream where the Lower River Suir SAC is present downstream (c. 600m) and the River Barrow and River Nore SAC is >5km further downstream of the discharge point in question.

Site Surface Water Drainage

Standard best practice environmental controls (*i.e.* soil and water management) to protect the surrounding environment will be implemented during construction and operation to minimise any potential risk of surface and/or groundwater pollution through, siltation, nutrient release and/or contamination (see outline oCEMP submitted as part of this application, Chapters 6 and 7 of this EIAR, Engineering Planning Report MAL 2019a and supporting documents). While primarily designed to address environmental risks associated the residential development site only, these standard best practice environmental controls, will also serve to minimise potential construction phase run-off impacts into the wider environment including the River Suir (and Lower River Suir SAC and River Barrow and River Nore SAC), even if this is not the primary aim of these protection measures.

As construction works progress, and as such during the operational phase it is understood that the proposed controlled (*i.e.* restricted to 2 litres per second per hectare, MAL 2019a) surface water drainage will be directed

into the existing public surface-water sewer network, which discharges to a tributary of Blenheim Stream (and as such ultimately the River Suir) at Dunmore Road. The surface water drainage infrastructure for the proposed development has been designed with reference to the GDSDS with standard environmental controls including; controlled run-off rates, surface water attenuation, SuDS and flow control; providing for 100-year storm events, swales, surface water infiltration and permeable paving (see MAL 2019a). Based on the appropriate surface water management design, the study site is not at risk of fluvial flooding and it will not contribute to any possible flooding to downstream lands (MAL 2019b). As all surface water discharge (up to 100-year storm event) will be adequately controlled on site, prior to controlled discharge to the tributary of the Lower River Suir, there is no potential for contaminated discharge entering the River as a result of surface water discharge from the proposed development site. While the proposed surface water management will be specific to the study site development and the River Suir, it will also minimise any potential run-off impacts to the wider environment, including the Lower River Suir SAC and River Barrow and River Nore SAC.

Taking the above into consideration, no indirect habitat loss or deterioration of either SAC in relation to contaminated surface-water run-off arising from the construction/operational phases of the proposed development at the study site is deemed likely.

Freshwater influence

As described above, once initiated surface-water drainage associated with the proposed development will be intercepted by an existing public sewer at Dunmore Road that will then discharge to a tributary of Blenheim Stream prior to discharging to the River Suir at King's Channel. Additional freshwater inputs arising from the proposed development into Blenheim Stream and onwards towards King's Channel may have potential freshwater influence on existing estuarine habitats including Atlantic Salt Meadow of the relevant designated sites in terms of affecting vegetation structure/succession and/or habitat erosion.

Existing Atlantic Salt Meadow habitat structure assessed in 2018 at and in the vicinity of the SWOs outfall to King's Channel, did not show any evidence to indicate on-going influence from existing freshwater inputs (*e.g*. increase in brackish reed species like Common Reed and Sea Club Rush) associated with this SWOs located here, and which has been in place for a number of years now as part of the Waterford Main Drainage scheme that was commissioned from 2010; this includes Atlantic Salt Meadow areas along the lower sections of the tidal creeks and pans relevant to the section of King's Channel/SWOs outfall in question. While taking this into consideration it is also important to note that the freshwater surface water discharge point for this development at Knockboy is to a small freshwater tributary of Blenheim stream associated with terrestrial vegetation (*i.e.* trees/scrub) upstream of the brackish and saline saltmarsh habitats associated with the Lower River Suir SAC. Based on the surface water management proposals, together with the location of the surface water discharge point, controlled freshwater inputs from the proposed development (up to 100 year storm event) are unlikely to influence the brackish or saline concentrations of the large tidal water volume and as such promote a vegetative community shift (*i.e.* change in salt marsh habitat structure or succession to different plant communities less tolerant of current estuarine tidal conditions). While the proposed surface water management will be specific to the site development and the River Suir, it will also minimise any potential freshwater influences on saline/estuarine habitats in the wider environment, including the Lower River Suir SAC and River Barrow and River Nore SAC.

Erosion is also a pressure that can negatively impact on saltmarsh extent within an estuarine system. Saltmarshes can go through cycles of erosion and accretion naturally, where such natural erosion should not be classified as a pressure (see McCorry and Ryle 2009a, Devaney and Perrin 2015). Erosion of a saltmarsh resulting in a loss in extent/area is only considered an irreparable impact if there is no opportunity for a landward retreat due to the impacts of coastal squeeze resulting from hard-coastal defences and/or other man-made barriers (see McCorry and Ryle 2009a, Boorman 2003). Natural erosion can be considered reparable if there is potential for landward retreat in the future, such as if an embankment is breached and/or

if there is a change in land use. In this case, the only erosion documented at the Atlantic Salt Meadow study area in 2018 related to the narrow coastal band associated with the existing earthen embankment/flood defence section that is considered to be as a result of natural tidal actions; although, this embankment that may influence Atlantic Salt Meadow erosion through associated coastal squeeze impacts (see Boorman 2003). While some evidence of erosion was noted along the same narrow coastal band in 2007, it was not considered significant at the time (see McCorry and Ryle 2009a). No significant tidal erosion was evident in 2018 along the creeks and pans present within the Atlantic Salt Meadow study area overall. Furthermore, as described above, the design of the surface water drainage infrastructure for Knockboy is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs at King's Channel.

Taking the above into consideration, no indirect habitat loss or deterioration of the Lower River Suir SAC and River Barrow River Nore SAC in relation to freshwater influence arising from surface-water drainage associated with the proposed development at the study site is deemed likely.

5.1.3 Indirect Habitat Loss or Deterioration: Waste-Water / Foul Effluent Drainage

Indirect habitat loss or deterioration of Natura 2000 sites (including water quality) within the surrounding area can occur from the effects of run-off or discharge into the aquatic environment through impacts such as increased siltation, nutrient release and/or contamination. This requires connectivity between the study site and the Natura 2000 sites in question through watercourses and/or drainage. This potentially applies to the River Suir where construction/operational stage waste-water/foul effluent will discharge via the public foul sewer network and associated Waterford City WWTP when connected to the network where the Lower River Suir SAC is present at the WWTP discharge point and the River Barrow and River Nore SAC is *c.* 3.1km downstream of the WWTP discharge point location.

As described earlier, during initial construction works and before the residential site is connected to the public effluent sewer network, construction phase waste-water/foul effluent will be managed at a temporary site compound (*e.g.* site portaloos and welfare units) with all waste removed from site by licenced waste disposal. Therefore, no potential hydrological link from waste-water/effluent is relevant to any of the designated conservation sites under consideration.

5.1.4 Existing SWOs at King's Channel: Raw Sewage

Prior to the transfer to the Waterford City WWTP this local authority drainage network transfers waste water/effluent drainage to Island View pumping station, where it is subsequently pumped onwards to the WWTP. As described earlier, Island View pumping station has a combined sewer overflow (CSO) and emergency overflow (EO) system (collectively surface water overflows SWOs, after RPS 2019), which when triggered (by excess surface water ingress), discharges to the Lower River Suir Estuary at Little Island/King's Channel.

Raw sewage occassionally discharges as overflow from Island View pumping station via the SWOs at King's Channel on the River Suir (and associated designated sites). As the waste-water/effluent associated with the proposed development at Knockboy is directed into the public sewer network, including Island View pumping station, there is the potential for raw sewage associated with the proposed development would be part of the overflow at the SWOs. Of note here, is the fact that the design of the surface water drainage infrastructure is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs. In other words, the frequency of raw sewage discharge through the existing SWOs at King's Channel will not be triggered by surface water discharge from this proposed development.

In 2007 part of the SMP Little Island Atlantic Salt Meadow site (that overlaps the Atlantic Salt Meadow study area included as part of the NIS for this application) was noted as likely to be affected by raw sewage flowing along a drainage channel that passed through a large stand of Common Reed before discharging into King's Channel (see McCorry & Ryle 2009a & 2009b). While the 'likely' effect of nutrient enrichment arising from sewage discharge present in 2007 was the main reason that the structure and functions of Atlantic Salt Meadow here were assessed as *unfavourable-inadequate* at the time, it was also acknowledged that no significant negative impact from sewage discharge occurred in relation to the structure and function of the Atlantic Salt Meadow habitat in question (McCorry & Ryle 2009b). In terms of future prospects and recommendations in relation to Atlantic Salt Meadow habitat in 2007, the continuation of sewage discharge and investigation of such was highlighted (McCorry & Ryle 2009b). However, it is important to note that such historic management of sewage here has since been superseded by the Waterford Main Drainage scheme commissioned from 2010 (see WCC 2013a) where raw sewage locally now comprises of occasional overflow from the nearby Island View pumping station that currently discharges directly into King's Channel (*i.e.* the River Suir channel) via the aforementioned SWOs and not via a drainage channel within associated saltmarsh habitat.

In respect of the existing Atlantic Salt Marsh habitat structure at and in the vicinity of the outfall under consideration here, the 2019 RPS assessment did not find any evidence to indicate on-going nutrient input influence related to occasional raw sewage releases (*e.g*. increase in brackish reed species like Common Reed and Sea Club Rush) associated with this outfall at King's Channel that has been in place for several years as part of the Waterford Main Drainage scheme (commissioned from 2010); this includes saltmarsh/Atlantic Salt Meadow areas along the lower sections of the tidal creeks and pans relevant to the section of King's Channel/outfall in question here.

The 'assimilative capacity' is a measure of a receiving water's ability to absorb pollutants whilst still maintaining acceptable water quality (RPS 2019). An assimilative capacity assessment of the River Suir (RPS 2019) examined the potential impacts that will arise from the additional sewage loading from the proposed development to the SWOs and ultimately to the Lower Suir Estuary which was examined in the context of key factors that could potentially affect the attainment of any of WFD Objectives (RPS 2019). Based on this assessment, it is considered that the negligible increase in nutrient and BOD concentrations will not impact on the Lower Suir Estuary and as such nearby Natura 2000 sites (RPS 2019). Overall, it is considered that the additional loading from the development will have an 'undetectable impact' on the receiving water and will not represent any risk to the achievement of the water body's environmental objectives (under Article 4 of the WFD). As noted, the negligible increases are due to a significant dilution effects due to the large flows from the River Suir (RPS 2019).

While the WWTP discharge location is within the Lower River Suir SAC, it is *c.* 2km downstream of the nearest confirmed Atlantic Salt Meadow at Little Island (after McCorry and Ryle 2009a and NPWS 2017). Confirmed Atlantic Salt Meadow areas associated with the River Barrow and River Nore SAC are located upstream of its confluence with the Lower River Suir SAC (see NPWS 2011a) and therefore not relevant here.

Taking the above into consideration, no indirect habitat loss or deterioration on either SAC in relation to occasional raw sewage overflow from Island View pumping station SWOs associated with the proposed development at the study site is deemed likely in this case.

5.1.5 Treated Sewage Discharge (via Waterford City WWTP)

Waterford WWTP is currently compliant with regard to its licensed emissions, where its discharge does not have an observable negative impact on water quality or Water Framework Directive (WFD) status of the receiving waters of the River Suir/SAC (see Irish Water 2018). Furthermore, Waterford WWTP currently has significant capacity to accept the additional organic PE loading arising from the proposed development (see

Irish Water 2018); where Irish Water has also verified that the foul connection to the public network and associated WWTP can be accommodated.

While the WWTP discharge location is within the Lower River Suir SAC, it is *c.* 2km downstream of the nearest confirmed Atlantic Salt Meadow at Little Island (after McCorry and Ryle 2009a and NPWS 2017). Confirmed Atlantic Salt Meadow areas associated with the River Barrow and River Nore SAC are located upstream of its confluence with the Lower River Suir SAC (see NPWS 2011a) and therefore not relevant here.

While there are other qualifying interests for both SACs where water quality is a specific attribute/target (*e.g.* Freshwater Pearl Mussel *Margaritifera margaritifera*, White-clawed Crayfish *Austropotamobius pallipes*, Twaite Shad *Alosa fallax*, Atlantic Salmon *Salmo salar* and Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation), such qualifying interests are more relevant to upstream locations than the transitional waterbody section of both SACs downstream here (see NPWS 2011a and 2017).

Taking the above into consideration, no indirect habitat loss or deterioration on either SAC via operational phase waste-water arising from the development and treated at Waterford WWTP is deemed likely.

5.1.6 Potential Impacts: Conclusions

Taking the above into consideration, it can be objectively concluded that no elements of the proposed development may potentially impact on qualifying interests of the Natura 2000 sites; Lower River Suir SAC and the River Barrow and River Nore SAC. The key considerations that contributed towards this conclusion are summarised as follows;

- The proposed study site is not located within the boundaries of the Natura 2000 site in question, does not include any key habitats or species relating to the conservation objectives of these designated sites and as such direct impacts on the Natura 2000 sites in question are not of concern.
- The implementation of construction and operational phase soil and water management proposals will adequately reduce potential risks arising from site associated hydrological or water quality impacts on the River Suir, which includes a proposed new surface water sewer, which will discharge to the public surface water sewer at Dunmore Rd. The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. As all surface water discharge (up to 1/100-year storm events) will be adequately controlled on site, prior to controlled discharge to the tributary of the Lower River Suir Estuary, there is no potential for contaminated discharge entering the River as a result of surface water discharge. While the proposed soils and water management proposals will be specific to the site, development and River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to these SACs as such.
- Based on the results obtained for the Atlantic Salt Meadow 1330 assessment (2018), there has been no change to the key attributes of these habitat since 2007 (SMP); except for changes in area/extent which appear to be a result of natural tidal erosion and succession to other saltmarsh or brackish/freshwater habitats.
- The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. Based on the surface water management proposals, together with the location of the surface water discharge point (to a freshwater tributary of Blenheim Stream upstream of brackish/saline habitats, controlled freshwater inputs from the proposed development (up to 100 year storm event) are considered unlikely to exert an influence on the brackish or saline

concentrations of the large tidal water volume of The River Suir and as such promote erosion or a vegetative community shift (*i.e.* change in saltmarsh habitat structure or succession to other habitats) of the brackish and saline saltmarsh habitats associated with the SACs downstream.

- The only erosion documented at the Atlantic Salt Meadow study area in 2018 related to the narrow coastal band associated with the existing earthen embankment section that is considered to be as a result of natural tidal actions, with no significant tidal erosion evident in 2018 along the creeks and pans present within the Atlantic Salt Meadow study area overall.
- Historic presence and management of raw sewage at the Atlantic Salt Meadow study area has been superseded by the Waterford Main Drainage scheme (2010), where raw sewage locally now comprises of occasional overflow from the nearby Island View pumping station that currently discharges directly into King's Channel (*i.e.* river channel) via the existing SWOs and not via a drainage channel with associated saltmarsh habitat. Existing saltmarsh habitat structure assessed in 2018 at and in the vicinity of the outfall under consideration here did not find any evidence to indicate on-going nutrient input influence related to occasional raw sewage releases from the SWOs at King's Channel.
- An assimilative capacity assessment of the River Suir (RPS 2019) examined the potential impacts that will arise from the additional sewage loading from the proposed development to the SWOs and ultimately to the Lower Suir Estuary which was examined in the context of key factors that could potentially affect the attainment of any of WFD Objectives (RPS 2019). Based on this assessment, it is considered that the negligible increase in nutrient and BOD concentrations will not impact on the Lower Suir Estuary and as such nearby Natura 2000 sites (RPS 2019). Overall, it is considered that the additional loading from the development will have an 'undetectable impact' on the receiving water and will not represent any risk to the achievement of the water body's environmental objectives (under Article 4 of the WFD). As noted, the negligible increases are due to a significant dilution effects due to the large flows from the River Suir (RPS 2019).
- Other pressures, such as recreational/amenity use were not documented within areas of Atlantic Salt Meadow 1330 present at the study site in 2018. Recreational tracks were noted along the western edge of the SAC, in other saltmarsh CM2 and adjacent to terrestrial habitats here only and as such recreational impact on Atlantic Salt Marsh 1330 is not of concern. Furthermore, the development proposed here does not include for any specific access to the Atlantic Salt Meadow area.
- Waterford WWTP is currently compliant, where its treated discharge does not have an observable negative impact on water quality or Water Framework Directive (WFD) status of the receiving waters of the River Suir/SAC. Furthermore, Waterford WWTP currently has capacity to accept the additional organic PE loading arising from the proposed development; where Irish Water has also verified that the foul connection to the public network and associated WWTP can be accommodated.
- Disturbance/displacement impacts (including ex situ) are not considered relevant here due to distances involved and where the study site does not support habitats of high ecological value for mobile faunal qualifying interests (largely waterbirds, Otter) of the relevant designated sites under consideration.
- Flooding/floodplain impacts are not considered relevant here as the development study site is not at risk of fluvial flooding and the proposed surface-water drainage system is designed such that it will not contribute to any possible flooding of downstream lands.

5.2 Cumulative Impacts with other known plans or projects

The proposed development will consist of the construction of 361 no. residential units at Knockboy, Waterford, together with all associated site works and services (*e.g.* vehicle and pedestrian access, landscaping, site drainage infrastructures *etc*.). The proposed development will include works to accommodate connections to an existing public effluent sewer (Island View pumping station/WWTP), public

water mains and surface water drainage infrastructure that will ultimately connect to an existing public drainage network on Dunmore Road (R683).

The proposed residential site is not located within the boundaries of any designated nature conservation site and does not include any key habitats or species relating to the conservation objectives of designated sites; therefore, there will be no direct loss of key habitats, flora or fauna relating to the designated conservation sites; The Lower River Suir and River Barrow and River Nore SAC as a result of the proposed development (in combination with other known plans or projects).

In order to assess the potential for cumulative impacts with other known and or permitted developments a desktop review of WCCC online planning database was completed – www.waterfordcitycouncil.ie/eplan). A list of the most relevant applications reviewed are presented below (table 5.10). Due to the volume of applications present in the locality this search concentrated on greenfield sites (identified by most recent aerial) within the potential catchment/local area, where a planning symbol is attached (*i.e.* red, orange and green dot). A subsequent random search of planning relating to already built structures nearby, such as private residential homes, was also completed which suggested these planning applications related to changes to the existing structure/layout, extensions *etc*., rather than a complete new project that would require additional inputs through loss of current greenfield sites, surface/storm water and waste/sewage drainage and as such it is considered that such projects are unlikely to have a cumulative/in combination impact with the proposed development. Of the applications examined at least four residential developments applications have been refused on appeal to APB, one has a decision pending, one has an extension of planning and eight have planning permission (including an overlap for same application site at Ballinakill - *i.e.* 2014 16 dwellings and 2018 a number of individual applications for the same site). A granting of planning permission for one residential development (Planning ref.: 08500096 (2008)) has since lapsed. One SHD application is with ABP and as such a decision is pending.

An application to ABP (PL.93. 303630) for an SHD (324 no. residential units) located at Williamstown Rd, Grantstown, is accompanied by an EIAR and NIS (available at www. Williamstownroadplanning.ie). Potential cumulative impacts on biodiversity in respect of loss/change in habitat and associated flora and fauna is not considered of particular concern. In relation to cumulative effects; taking the surface-water management proposals incorporated into this development, which compliments the 2013-2019 Waterford City Development Plan policies through the inclusion of attenuated storm-water and separation of surface and foul water, and assuming that all other housing developments closely adhere to best practice regarding soil and water management during construction and operational phases, as proposed, then significant negative cumulative effects with other permitted/proposed projects are considered unlikely (KES, 2019).

WCCC/APB File No.:	Date	Brief Description of the project
14600380	2014	16 no. residential homes and associated site services, Ballinakill
15724	2015	(a) Outline permission for 9 houses and (b) full planning permission for site development works for 9 sites including a new entrance and connection to existing services on adjoining link road together with all associated site works, Ballinakill
1816	2018	One new 2 storey dwelling, and all ancillary and associated site works, Ballinakill
1812	2018	One new 2 storey dwelling, and all ancillary and associated site works, Ballinakill
1815	2018	One new 2 storey dwelling, and all ancillary and associated site works, Ballinakill
1817	2018	One new 2 storey dwelling, and all ancillary and associated site works, Ballinakill
18350	2018	One new 2 storey dwelling, and all ancillary and associated site works, Ballinakill
18479	2018	One new 2 storey dwelling, and all ancillary and associated site works, Ballinakill
17877	2018	23 two storey dwellings and all ancillary and associated site works, Knockboy
1868	2018	20 detached two storey dwellings and all associated site works. Knockboy

WCCC/APB File No.:	Date	Brief Description of the project
SHD Application to ABP. PL93. 303630	2019	Application to ABP for permission for a SHD at Williamstown Road, Grantstown, Co. Waterford (324no. residential units). An Environmental Impact Assessment Report EIAR and NIS have been prepared.

Table 6.1. Planning applications with a granting of planning permission, granting of extension to planning (17877) or decision pending (18479) considered as part of this cumulative assessment, with the application reference number (where applicable), date and brief description of the project.

Overall based on the biodiversity assessment undertaken for the EIAR, this study site at Knockboy is currently considered to be of low to higher local importance as it supports semi-natural habitats and modified habitats with local wildlife/biodiversity value. Potential cumulative impacts on biodiversity in respect of loss/change in habitat and associated flora and fauna is not considered of particular concern. Potential off-site/indirect cumulative impacts arising from the proposed development here includes surface-water and foul effluent inputs into the River Suir and associated SAC via the public networks (*i.e.* surface-water drainage intercepted at Dunmore Rd and waste-water effluent drainage to Waterford City WWTP via Island View pumping station), where designated sites could be subject to cumulative impact through water quality impacts such as increased siltation, nutrient release, contaminated run-off arising from other housing development sites.

The current Waterford City Development Plan (2013-2019) demonstrates compliance with other strategic and EU Directive requirements (WCC 2013a). In addition, a SEA of the Plan examined the potential impact(s) of the Development Plan and its objectives on the environment as a whole. Measures for protecting and enhancing water quality in the City, contained in the South East RBD Management Plan, were taken into account in compliance with the WFD (WCC 2013b). In addition, both the Development Plan and its associated SEA have been informed by a Strategic Flood Risk Assessment. It is understood that the resulting environmental management policies and objectives outlined within the Development Plan are consistent with the South East RBD Management Plan (2009-2015) policies and objectives and are therefore considered to be compliant in meeting the water quality objectives of the WFD (WWC 2013a). Furthermore, an assimilative capacity assessment of the River Suir examined the potential impacts that may arise from the additional sewage loading from the proposed development to the SWOs at Island View pumping station and ultimately to the Lower Suir Estuary which was examined in the context of key factors that could potentially affect the attainment of any of WFD Objectives (RPS 2019, see Appendix B). Based on this assessment, it is considered that the negligible increase in nutrient and BOD concentrations will not impact on the Lower Suir Estuary and as such nearby designated sites (RPS 2019). Overall, it is considered that the additional loading from the development will have an 'undetectable impact' on the receiving water and will not represent any risk to the achievement of the water body's environmental objectives (under Article 4 of the WFD). As noted in this report, the negligible increases are due to a significant dilution effect due to the large flows associated with the River Suir (RPS 2019). This assimilative capacity assessment of the River Suir included an assessment of cumulative impacts with other developments within the locality which would utilise the same foul/effluent collection system. This mass balance assessment was based on an estimated population increase and resulting loadings for the proposed development at Knockboy with an additional PE of 2,662 for nearby proposed developments that are within the drainage catchment area of Island View pumping station (RPS 2019). Based on this cumulative assessment, the results show negligible increases in concentrations in the Lower Suir Estuary and as such, it is concluded that additional cumulative loadings (*i.e.* this proposed development and other proposed/permitted developments in the associated catchment area (up to PE 2,662)), will not adversely impact on the water quality status of the Lower River Suir transitional waterbody (RPS 2019).

Taking the above into consideration with regard to other known, pending and/or permitted housing developments reviewed, together with an evaluation of the biodiversity value of this study site, the surface-water and waste-water effluent design and assuming other developments are completed in compliance with the water quality objectives of the Development Plan (2013 – 2019), a potential for cumulative significant effects on the Lower River Suir SAC and River Barrow and River Nore SAC as a result of land take and/or cumulative drainage impacts (sewage and/or surface/ water inputs) from the proposed development site in combination with other known and/or permitted developments in the associated locality is deemed unlikely.

5.3 Mitigation Measures

As outlined in section 5.1 standard environmental protection measures have been integrated as part of the proposed development under consideration here. While such measures are specific to the site, development and the River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to the SACs as such.

As connection to the public sewer are initiated all construction and operational surface water discharge (up to 1/100-year storm events) will be adequately controlled on site, prior to controlled discharge to the tributary of the Lower River Suir Estuary, and as such there is no potential for contaminated discharge entering the River (and the Lower River Suir SAC and River Barrow and River Nore SAC) as a result of surface water discharge and the risk of flooding is not considered relevant here as the development study site is not at risk of fluvial flooding and the proposed surface-water drainage system is designed such that it will not contribute to any possible flooding of downstream lands.

As connections to the public sewer are initiated all construction and operation waste-water effluent discharge will be transferred to Waterford City WWTP via Island View Pumping Station. Based on the conclusions of this NIS as summarised in Section 5.1.6 above, potential impacts on the Lower River Suir SAC and River Barrow and River Nore SAC as a result of occassional raw sewage discharge for Island View pumping station and treated discharge from Waterford City WWTP it is considered unlikely.

Based on the conclusions of this NIS, including the standard best practice to be implemented for the construction phase, together with the surface/storm water drainage design for the construction and operational phases it is considered that additional mitigation is not now required as the proposed development is not now expected to have any significant effect on the integrity of the Lower River Suir SAC and River Barrow and River Nore SAC through surface water/waste-water effluent drainage associated with the development.

5.3.1 Likely Success of the Mitigation Measures

The environmental protection measures for the construction and operational stages have been developed in accordance with standard policy, regulations and guidelines including;

- The SUDS Manual
- The Greater Dublin Strategic Drainage Study (GDSDS)
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (published by the Department of Environment Heritage and Local Government in conjunction with the National Construction and Demolition Waste Council, July 2006). The Guidelines promote an integrated approach to the management of this waste stream. They are designed to promote sustainable development, environmental protection and the optimum use of resources. The

Guidelines introduce the concept of integrated waste management planning for construction projects above certain thresholds.

- CIRIA document 133 Waste Minimisation in Construction
- Irish Water Code of Practice for Wastewater Infrastructure, Building Regulations (Section H) guidance appropriate for the assessment of flood risk is to be found in the "Guidelines for Planning Authorities" titled "The Planning System and Flood Risk Management" published in November 2009 by the Office of Public Works (OPW) and the Department of Environment, Heritage and Local Government (DOEHLG).

While such measures are specific to the site, development and the River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to the SACs as such.

5.3.2 Timescale for the Implementation of Mitigation Measures

- The mitigation measures will be implemented prior to/during the relevant works being carried out.
- Mitigation measures relevant to the operational phase will be implemented and maintained on an ongoing basis.

While such measures are specific to the site, development and the River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to the SACs as such.

Based on the conclusions of this NIS, including the implementation of standard best practice measures for the construction phase, together with the surface/storm water drainage design for the construction and operational phases it is considered that additional mitigation is not now required as the proposed development is not now expected to have any significant effect on the integrity of the Lower River Suir SAC and River Barrow and River Nore SAC through surface water/waste-water effluent drainage associated with the development.

5.3.3 Contingency Plan for Mitigation Failure

- The mitigation measures will be implemented prior to the relevant works being carried out.

During the construction stage the following procedures will be undertaken in response to any pollution incident at the study site:

- The source and/or activities relating to the incident will be stopped immediately
- Adequate steps will be taken to filter and/or slow down the rate of discharge/slippage
- The relevant authorities, such as EPA, IFI etc., will be contacted immediately

While such measures are specific to the site, development and the River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to the SACs as such.

Based on the conclusions of this NIS, including the implementation of standard best practice measures for the construction phase, together with the surface/storm water drainage design for the construction and operational phases it is considered that additional mitigation is not now required as the proposed

development is not now expected to have any significant effect on the integrity of the Lower River Suir SAC and River Barrow and River Nore SAC through surface water/waste-water effluent drainage associated with the development.

6. Appropriate Assessment

6.1 Assessment of the Effects of the Project or Plan on the Integrity of the Natura 2000 Site

There are no elements of the proposed development that are likely to give rise to significant effects on the Natura 2000 sites; Lower River Suir SAC and the River Barrow and River Nore SAC. The key considerations that contributed towards this conclusion are summarised as follows;

- The proposed study site is not located within the boundaries of the Natura 2000 site in question, does not include any key habitats or species relating to the conservation objectives of these designated sites and as such direct impacts on the Natura 2000 sites in question are not of concern.
- The implementation of construction and operational phase soil and water management proposals will adequately reduce potential risks arising from site associated hydrological or water quality impacts on the River Suir, which includes a proposed new surface water sewer, which will discharge to the public surface water sewer at Dunmore Rd. The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. As all surface water discharge (up to 1/100-year storm events) will be adequately controlled on site, prior to controlled discharge to the tributary of the Lower River Suir Estuary, there is no potential for contaminated discharge entering the River as a result of surface water discharge. While the proposed soils and water management proposals will be specific to the site, development and River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to these SACs as such.
- Based on the results obtained for the Atlantic Salt Meadow 1330 assessment, there has been no change to the key attributes of these habitat since 2007 (SMP); except for changes in area/extent which appear to be a result of natural tidal erosion and succession to other saltmarsh or brackish/freshwater habitats.
- The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. Based on the surface water management proposals, together with the location of the surface water discharge point (to a freshwater tributary of Blenheim Stream *c*. 601m upstream of brackish/saline habitats (direct overland), controlled freshwater inputs from the proposed development (up to 100 year storm event) are considered unlikely to exert an influence on the brackish or saline concentrations of the large tidal water volume of The River Suir and as such promote erosion or a vegetative community shift (*i.e.* change in saltmarsh habitat structure or succession to other habitats) in the brackish and saline saltmarsh habitats associated with the SACs downstream.
- The only erosion documented at the Atlantic Salt Meadow study area in 2018 related to the narrow coastal band associated with the existing earthen embankment section that is considered to be as a result of natural tidal actions, with no significant tidal erosion evident in 2018 along the creeks and pans present within the Atlantic Salt Meadow study area overall.

- Historic presence and management of raw sewage at the Atlantic Salt Meadow study area has been superseded by the Waterford Main Drainage scheme (2010), where raw sewage locally now comprises of occasional overflow from the nearby Island View pumping station that currently discharges directly into King's Channel (*i.e.* river channel) via the existing SWOs and not via a drainage channel with associated saltmarsh habitat. Existing saltmarsh habitat structure assessed in 2018 at and in the vicinity of the outfall under consideration here did not find any evidence to indicate on-going nutrient input influence related to occasional raw sewage releases from the SWOs at King's Channel.

- An assimilative capacity assessment of the River Suir (RPS 2019) examined the potential impacts that will arise from the additional sewage loading from the proposed development to the SWOs and ultimately to the Lower Suir Estuary which was examined in the context of key factors that could potentially affect the attainment of any of WFD Objectives (RPS 2019). Based on this assessment, it is considered that the negligible increase in nutrient and BOD concentrations will not impact on the Lower Suir Estuary and as such nearby Natura 2000 sites (RPS 2019). Overall, it is considered that the additional loading from the development will have an 'undetectable impact' on the receiving water and will not represent any risk to the achievement of the water body's environmental objectives (under Article 4 of the WFD). As noted, the negligible increases are due to a significant dilution effects due to the large flows from the River Suir (RPS 2019).

- Other pressures, such as recreational/amenity use where not documented within areas of Atlantic Salt Meadow 1330 present at the study site in 2018. Recreational tracks were noted along the western edge of the SAC, in other saltmarsh CM2 and adjacent to terrestrial habitats here only and as such recreational impact on Atlantic Salt Marsh 1330 is not of concern. Furthermore, the development proposed here does not include for any specific access to the Atlantic Salt Meadow area.

- Waterford WWTP is currently compliant, where its treated discharge does not have an observable negative impact on water quality or Water Framework Directive (WFD) status of the receiving waters of the River Suir/SAC. Furthermore, Waterford WWTP currently has capacity to accept the additional organic PE loading arising from the proposed development; where Irish Water has also verified that the foul connection to the public network and associated WWTP can be accommodated.

- Disturbance/displacement impacts (including ex situ) are not considered relevant here due to distances involved and where the study site does not support habitats of high ecological value for mobile faunal qualifying interests (largely waterbirds, Otter) of the relevant designated sites under consideration.

- Flooding/floodplain impacts are not considered relevant here as the development study site is not at risk of fluvial flooding and the proposed surface-water drainage system is designed such that it will not contribute to any possible flooding of downstream lands.

- With regard to other known and/or permitted developments reviewed and assuming all developments are compliant with the water quality objectives of the County Development Plan (2013 – 2019), it is objectively concluded that there is no potential for cumulative significant effects on the Natura 2000 sites as a result of cumulative drainage impacts (sewage and/or surface/storm water inputs) from the proposed development site in combination with other known and/or permitted developments in the catchment area.

6.2 Conservation objectives of the Natura Site

The Conservation objectives are set out in Section 4 of this NIS.

6.3. Describe how the project or plan will affect key species and key habitats of the Natura 2000 site.

No elements of the project may potentially impact on key species and key habitats of the Natura 2000 sites; Lower River Suir SAC and the River Barrow and River Nore SAC. The key considerations that contributed towards this conclusion are summarised as follows;

- The proposed study site is not located within the boundaries of the Natura 2000 site in question, does not include any key habitats or species relating to the conservation objectives of these designated sites and as such direct impacts on the Natura 2000 sites in question are not of concern.

- The implementation of construction and operational phase soil and water management proposals will adequately reduce potential risks arising from site associated hydrological or water quality impacts on the River Suir, which includes a proposed new surface water sewer, which will discharge to the public surface water sewer at Dunmore Rd. The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. As all surface water discharge (up to 1/100-year storm events) will be adequately controlled on site, prior to controlled discharge to the tributary of the Lower River Suir Estuary, there is no potential for contaminated discharge entering the River as a result of surface water discharge. While the proposed soils and water management proposals will be specific to the site, development and River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to these SACs as such.

- Based on the results obtained for the Atlantic Salt Meadow 1330 assessment, there has been no change to the key attributes of these habitat since 2007 (SMP); except for changes in area/extent which appear to be a result of natural tidal erosion and succession to other saltmarsh or brackish/freshwater habitats.

- The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. Based on the surface water management proposals, together with the location of the surface water discharge point (to a freshwater tributary of Blenheim Stream *c*. 601m upstream of brackish/saline habitats (direct overland), controlled freshwater inputs from the proposed development (up to 100 year storm event) are considered unlikely to exert an influence on the brackish or saline concentrations of the large tidal water volume of The River Suir and as such promote erosion or a vegetative community shift (*i.e.* change in saltmarsh habitat structure or succession to other habitats) in the brackish and saline saltmarsh habitats associated with the SACs downstream.

- The only erosion documented at the Atlantic Salt Meadow study area in 2018 related to the narrow coastal band associated with the existing earthen embankment section that is considered to be as a result of natural tidal actions, with no significant tidal erosion evident in 2018 along the creeks and pans present within the Atlantic Salt Meadow study area overall.

- Historic presence and management of raw sewage at the Atlantic Salt Meadow study area has been superseded by the Waterford Main Drainage scheme (2010), where raw sewage locally now comprises of occasional overflow from the nearby Island View pumping station that currently discharges directly into King's Channel (*i.e.* river channel) via the existing SWOs and not via a drainage channel with associated saltmarsh habitat. Existing saltmarsh habitat structure assessed in 2018 at and in the vicinity of the outfall under consideration here did not find any evidence to indicate on-going nutrient input influence related to occasional raw sewage releases from the SWOs at King's Channel.

- An assimilative capacity assessment of the River Suir (RPS 2019) examined the potential impacts that will arise from the additional sewage loading from the proposed development to the SWOs and ultimately to the Lower Suir Estuary which was examined in the context of key factors that could potentially affect the attainment of any of WFD Objectives (RPS 2019). Based on this assessment, it is considered that the negligible increase in nutrient and BOD concentrations will not impact on the Lower Suir Estuary and as such nearby Natura 2000 sites (RPS 2019). Overall, it is considered that the additional loading from the development will have an 'undetectable impact' on the receiving water and will not represent any risk to the achievement of the water body's environmental objectives (under Article 4 of the WFD). As noted, the negligible increases are due to a significant dilution effects due to the large flows from the River Suir (RPS 2019).

- Other pressures, such as recreational/amenity use where not documented within areas of Atlantic Salt Meadow 1330 present at the study site in 2018. Recreational tracks were noted along the western edge of the SAC, in other saltmarsh CM2 and adjacent to terrestrial habitats here only and as such recreational impact on Atlantic Salt Marsh 1330 is not of concern. Furthermore, the development proposed here does not include for any specific access to the Atlantic Salt Meadow area.

- Waterford WWTP is currently compliant, where its treated discharge does not have an observable negative impact on water quality or Water Framework Directive (WFD) status of the receiving waters of the River Suir/SAC. Furthermore, Waterford WWTP currently has capacity to accept the additional organic PE loading arising from the proposed development; where Irish Water has also verified that the foul connection to the public network and associated WWTP can be accommodated.

- Disturbance/displacement impacts (including ex situ) are not considered relevant here due to distances involved and where the study site does not support habitats of high ecological value for mobile faunal qualifying interests (largely waterbirds, Otter) of the relevant designated sites under consideration.

- Flooding/floodplain impacts are not considered relevant here as the development study site is not at risk of fluvial flooding and the proposed surface-water drainage system is designed such that it will not contribute to any possible flooding of downstream lands.

- With regard to other known and/or permitted developments reviewed and assuming all developments are compliant with the water quality objectives of the County Development Plan (2013 – 2019), it is objectively concluded that there is no potential for cumulative significant effects on the Natura 2000 sites as a result of cumulative drainage impacts (sewage and/or surface/storm water inputs) from the proposed development site in combination with other known and/or permitted developments in the catchment area..

6.4 Describe how the integrity (determined by structure and function and conservation objectives) of the site are likely to be affected by the project and plan

No elements of the project may potentially impact on integrity of the Natura 2000 sites; Lower River Suir SAC and the River Barrow and River Nore SAC (e.g. through loss of habitat, disturbance, disruption, chemical changes, hydrological changes and geological changes *etc*.). The key considerations that contributed towards this conclusion are summarised as follows;

- The proposed study site is not located within the boundaries of the Natura 2000 site in question, does not include any key habitats or species relating to the conservation objectives of these designated sites and as such direct impacts on the Natura 2000 sites in question are not of concern.

- The implementation of construction and operational phase soil and water management proposals will adequately reduce potential risks arising from site associated hydrological or water quality impacts on the River Suir, which includes a proposed new surface water sewer, which will discharge to the public surface water sewer at Dunmore Rd. The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. As all surface water discharge (up to 1/100-year storm events) will be adequately controlled on site, prior to controlled discharge to the tributary of the Lower River Suir Estuary, there is no potential for contaminated discharge entering the River as a result of surface water discharge. While the proposed soils and water management proposals will be specific to the site, development and River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to these SACs as such.

- Based on the results obtained for the Atlantic Salt Meadow 1330 assessment, there has been no change to the key attributes of these habitat since 2007 (SMP); except for changes in area/extent which appear to be a result of natural tidal erosion and succession to other saltmarsh or brackish/freshwater habitats.

- The design of the surface water drainage is such that it will not discharge to Island View pumping station and as such will not add to or influence the current volume of surface water entering/triggering the SWOs outfall system. Based on the surface water management proposals, together with the location of the surface water discharge point (to a freshwater tributary of Blenheim Stream *c*. 601m upstream of brackish/saline habitats (direct overland), controlled freshwater inputs from the proposed development (up to 100 year storm event) are considered unlikely to exert an influence on the brackish or saline concentrations of the large tidal water volume of The River Suir and as such promote erosion or a vegetative community shift (*i.e.* change in saltmarsh habitat structure or succession to other habitats) in the brackish and saline saltmarsh habitats associated with the SACs downstream.

- The only erosion documented at the Atlantic Salt Meadow study area in 2018 related to the narrow coastal band associated with the existing earthen embankment section that is considered to be as a result of natural tidal actions, with no significant tidal erosion evident in 2018 along the creeks and pans present within the Atlantic Salt Meadow study area overall.

- Historic presence and management of raw sewage at the Atlantic Salt Meadow study area has been superseded by the Waterford Main Drainage scheme (2010), where raw sewage locally now comprises of occasional overflow from the nearby Island View pumping station that currently discharges directly into King's Channel (*i.e.* river channel) via the existing SWOs and not via a drainage channel with associated saltmarsh habitat. Existing saltmarsh habitat structure assessed in 2018 at and in the vicinity of the outfall under consideration here did not find any evidence to indicate on-going nutrient input influence related to occasional raw sewage releases from the SWOs at King's Channel.

- An assimilative capacity assessment of the River Suir (RPS 2019) examined the potential impacts that will arise from the additional sewage loading from the proposed development to the SWOs and ultimately to the Lower Suir Estuary which was examined in the context of key factors that could potentially affect the attainment of any of WFD Objectives (RPS 2019). Based on this assessment, it is considered that the negligible increase in nutrient and BOD concentrations will not impact on the Lower Suir Estuary and as such nearby Natura 2000 sites (RPS 2019). Overall, it is considered that the additional loading from the development will have an 'undetectable impact' on the receiving water

and will not represent any risk to the achievement of the water body's environmental objectives (under Article 4 of the WFD). As noted, the negligible increases are due to a significant dilution effects due to the large flows from the River Suir (RPS 2019).

- Other pressures, such as recreational/amenity use where not documented within areas of Atlantic Salt Meadow 1330 present at the study site in 2018. Recreational tracks were noted along the western edge of the SAC, in other saltmarsh CM2 and adjacent to terrestrial habitats here only and as such recreational impact on Atlantic Salt Marsh 1330 is not of concern. Furthermore, the development proposed here does not include for any specific access to the Atlantic Salt Meadow area.

- Waterford WWTP is currently compliant, where its treated discharge does not have an observable negative impact on water quality or Water Framework Directive (WFD) status of the receiving waters of the River Suir/SAC. Furthermore, Waterford WWTP currently has capacity to accept the additional organic PE loading arising from the proposed development; where Irish Water has also verified that the foul connection to the public network and associated WWTP can be accommodated.

- Disturbance/displacement impacts (including ex situ) are not considered relevant here due to distances involved and where the study site does not support habitats of high ecological value for mobile faunal qualifying interests (largely waterbirds, Otter) of the relevant designated sites under consideration.

- Flooding/floodplain impacts are not considered relevant here as the development study site is not at risk of fluvial flooding and the proposed surface-water drainage system is designed such that it will not contribute to any possible flooding of downstream lands.

- With regard to other known and/or permitted developments reviewed and assuming all developments are compliant with the water quality objectives of the County Development Plan (2013 – 2019), it is objectively concluded that there is no potential for cumulative significant effects on the Natura 2000 sites as a result of cumulative drainage impacts (sewage and/or surface/storm water inputs) from the proposed development site in combination with other known and/or permitted developments in the catchment area.

6.5 Mitigation measures to be introduced to avoid, reduce or remedy the adverse effects on the integrity of the site.

Mitigations are described in section 5.3. Standard environmental protection measures have been integrated as part of the proposed development under consideration here. While such measures are specific to the site, development and the River Suir, they will also serve to minimise potential construction/operational phase run-off impacts into the wider environment including the Lower River Suir SAC and the River Barrow and River Nore SAC (further downstream) even if not primarily designed to address any particular risks to the SACs as such.

As connection to the public sewer are initiated all construction and operational surface water discharge (up to 1/100-year storm events) will be adequately controlled on site, prior to controlled discharge to the tributary of the Lower River Suir Estuary, and as such there is no potential for contaminated discharge entering the River (and the Lower River Suir SAC and River Barrow and River Nore SAC) as a result of surface water discharge and the risk of flooding is not considered relevant here as the development study site is not at risk of fluvial flooding and the proposed surface-water drainage system is designed such that it will not contribute to any possible flooding of downstream lands.

As connection to the public sewer are initiated all construction and operation waste-water effluent discharge will be transferred to Waterford City WWTP via Island View Pumping Station. Based on the conclusions of this NIS as summarised in Section 5.1.6 above potential impacts on the Lower River Suir SAC and River Barrow and River Nore SAC as a result of occassional raw sewage discharge for Island View pumping station and Waterford City WWTP is considered unlikely.

Based on the conclusions of this NIS, including the implementation of standard best practice measures, together with the surface/storm water drainage design for the construction and operational phases it is considered that additional mitigation is not now required as the proposed development is not expected to have any significant effect on the integrity of the Lower River Suir SAC and River Barrow and River Nore SAC through surface water/waste-water effluent drainage associated with the development, even if the measures were not primarily designed to address any particular risks to the SACs as such.

References

Boorman, L.A. 2003. Saltmarsh Review. An overview of coastal saltmarshes, their dynamic and sensitivity characteristics for conservation and management.

Department of Environment, Heritage & Local Government (DoEHLG). 2009. Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities. DoEHLG, Dublin.

Devaney F.M. and Perrin 2015. Saltmarsh Angiosperm Assessment Tool for Ireland (SMAATIE). EPA Research End of Project Report No.163. Environment Protection Agency PO Box 3000, Johnstown Castle, Co. Wexford, Ireland.

European Commission. 2001. Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites –

European Commission Methodical Guidance on the provisions of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC. European Commission DG Environment, Oxford UK.

Environmental Protection Agency (EPA). 2013. Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioner's Manual. EPA STRIVE Programme 2007–2013; Report Series No. 106. EPA, Wexford.

Fossitt J.A. 2000. A Guide to Habitats in Ireland. Heritage Council, Kilkenny.

Irish Water. 2018. Annual Environmental Report 2016. Agglomeration Name: Waterford City. Licence Register No. D0022-01. Irish Water, Dublin.

McCorry and Ryle 2009a. Saltmarsh Monitoring Project 2007 – 2008. Volume 1. Final Report. A Report of Research Branch, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht.

McCorry and Ryle 2009b. Saltmarsh Monitoring Project 2007 – 2008. Volume 5. Final Report. A Report of Research Branch, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht.

Muir and Associates Limited MAL 2019. Proposed Residential Development at Knockboy, Waterford. Planning Submission. Engineering Design Report. Final Draft.

Muir and Associated Limited MAL 2019. Proposed Residential development at Knockboy, Waterford. Planning Submission. Site Specific Flood Risk Assessment. Draft.

NPWS. 2011a. Conservation Objectives: River Barrow and River Nore SAC 002162. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2011b. Conservation Objectives: Hook Head SAC 000764. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2012a. Conservation Objectives: Bannow Bay SAC 000697. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2012b. Conservation Objectives: Bannow Bay SPA 004033. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2013a. Conservation Objectives: Tramore Dunes and Backstrand SAC 000671. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2013b. Conservation Objectives: Tramore Back Strand SPA 004027. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2016. Conservation objectives for Mid-Waterford Coast SPA [004193]. Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS. 2017. Conservation Objectives: Lower River Suir SAC 002137. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

WCC (Waterford City Council). 2013a. Waterford City Development Plan 2013 – 2019.

WCC (Waterford City Council). 2013b. Strategic Environmental Assessment Environmental Report for Waterford City Development Plan 2013 – 2019.

Appendix A

Finding of No Significant Effects Report: Tramore Dunes & Backstrand SAC, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Hook Head SAC, Bannow Bay SAC and Bannow Bay SPA.

Name and location of the Natura 2000 sites.	Tramore Dunes & Backstrand SAC, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Hook Head SAC, Bannow Bay SAC and Bannow Bay SPA.
Description of the project or plan.	The proposed development will consist of the construction of 361 no. residential units at Knockboy, Waterford, together with all associated site works and services (*e.g.* vehicle and pedestrian access, landscaping, site drainage infrastructures *etc.*). The proposed development will include works to accommodate connections to an existing public effluent sewer (Island View pumping station/WWTP), public water mains and surface water drainage infrastructure that will ultimately connect to an existing public drainage network on Dunmore Road (R683).
Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?	No.
Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?	No.
The Assessment of Significant Effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site.	Due to the reasons outlined in the following section, it is felt that no elements of the project are likely to impact on the Natura 2000 sites; Tramore Dunes & Backstrand SAC, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Hook Head SAC, Bannow Bay SAC and Bannow Bay SPA.
Explain why these effects are not considered significant.	• As none of the Natura 2000 sites under consideration here overlap the proposed development site, direct impacts via habitat loss are not relevant. • As the Natura 2000 sites under consideration here are not downstream of the surface-water discharge point, no hydrological link via surface-water is relevant for these Natura 2000 sites. • As the Natura 2000 sites under consideration here are not downstream of the discharge point from Waterford WWTP, no hydrological link via foul water is relevant for the other Natura 2000 sites. • Disturbance/displacement impacts of fauna that are listed as qualifying interests of the Natura 2000 sites are not relevant here as (i) the site does not overlook the Natura 2000 sites due to distance and associated landscape characteristics (ii) the conservation objectives of the SACs largely relate to habitats and not fauna and (iii) the development supports limited habitat that could potentially be used ex-situ by qualifying interest species of the Natura 2000 sites under consideration here.
List of agencies consulted.	Waterford City & County Council.
Response to consultation.	No comment on the Natura 2000 sites in question here.

Data Collected to Carry out the Assessment			
Who carried out the assessment	**Sources of Data**	**Level of assessment completed**	**Where can the full results of the**

			assessment be accessed and viewed
Ms Michelle O Neill BSc Ecology & MCIEEM.	Associated documents/drawings. Site walkover. NPWS online designated site data/mapping. National Biodiversity Data Centre (NBDC) online mapping. EPA online water features mapping database Water Framework Directive online river database References (below)	Desktop study & site visit; am satisfied that this has yielded enough information to adequately complete a screening assessment.	Full results of the assessment are available in Section 4. above.

Appendix B

RPS 2019

Knockboy Residential Development

SWOs Discharge Assessment.

Knockboy Residential Development

Assessment of SWO discharge to Lower Suir Estuary

IBE1473 - April 2019

Knockboy Residential Development

SWO Discharge Assessment

April 2019

Document Control Sheet

Client:	Muir Associates Ltd.
Project Title:	Knockboy Residential Development
Document Title:	SWO Discharge Assessment
Document No:	IBE1473F03

Text Pages:	11	Appendices:	2

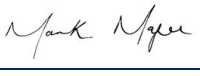
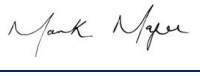
Rev	Statu	Date	Author(s)	Reviewed By		Approved By	
D01	Draft	16/05/2018	GO'C	MM		GG	
D02	Final Draft	25/05/2018	GO'C	MM		GG	
F01	Final	12/06/2018	GO'C	MM		GG	
F02	Final	28/02/2019	MM	MM		GG	
F03	Final	24/04/2019	MM	MM		GG	

Table of Contents

List of Tables

List of Figures

APPENDICES

1. INTRODUCTION

Muir Associates Limited, acting on behalf of Jackie Green Construction Ltd, have commissioned RPS to undertake an assessment of the potential impact of the additional sewage loading from a proposed residential development at Knockboy, County Waterford on the receiving water body, Lower Suir Estuary (Little Island - Cheekpoint) (code - IE_SE_100_0500). The proposed development of 370 residential units with a crèche to accommodate 100 children is within the drainage catchment of the Island View pumping station which pumps sewage via a rising main to Waterford City Waste Water Treatment Plant (WWTP) which is licenced in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 as amended. The foul effluent from the site will discharge to the existing foul sewer collection system and subsequently to Waterford City WWTP via the pumping station.

RPS have been tasked with undertaking a water quality assessment of the proposed additional loading to the sewer network and its potential impact on the receiving water, Lower Suir Estuary (Little Island - Cheekpoint), in the context of the environmental quality standards (EQS) listed in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI 272 /2009) for relevant physico-chemical parameters and the potential to impact on the Water Framework Directive (WFD) environmental objectives.

2. PROJECT BACKGROUND

2.1 Site Location

The Island View PS includes an overflow which discharges into the Kings Channel south of Little Island. This discharge is within the Lower River Suir Special Area of Conservation (SAC), which flows into the River Barrow and River Nore SAC.

A pre-connection enquiry with Irish Water (Connection and Developer Services) has established that there is adequate capacity within the existing wastewater infrastructure to accept the additional load subject to a valid connection agreement. On this basis it is assumed that the Waterford City WWTP has adequate capacity to accept and treat the additional loading from the development to the required standards (Emission Limit Values [ELV]) for the different physico-chemical parameters included in the Waste Water Discharge Licence (D0022-01) for the agglomeration. Therefore the increase in the influent loading to the WWTP from the development will not impact on the effluent from the WWTP which will continue to be compliant with licenced conditions established to protect the water quality in the receiving waters.

This assessment will therefore focus on the potential impact from the Surface Water Overflows (SWOs) from the agglomeration and associated collection system. The term SWO in this document includes combined sewer overflows (CSOs) and emergency overflows (EO). In the case of the Island View drainage catchment there is a CSO and EO which both discharge to the Lower Suir Estuary.

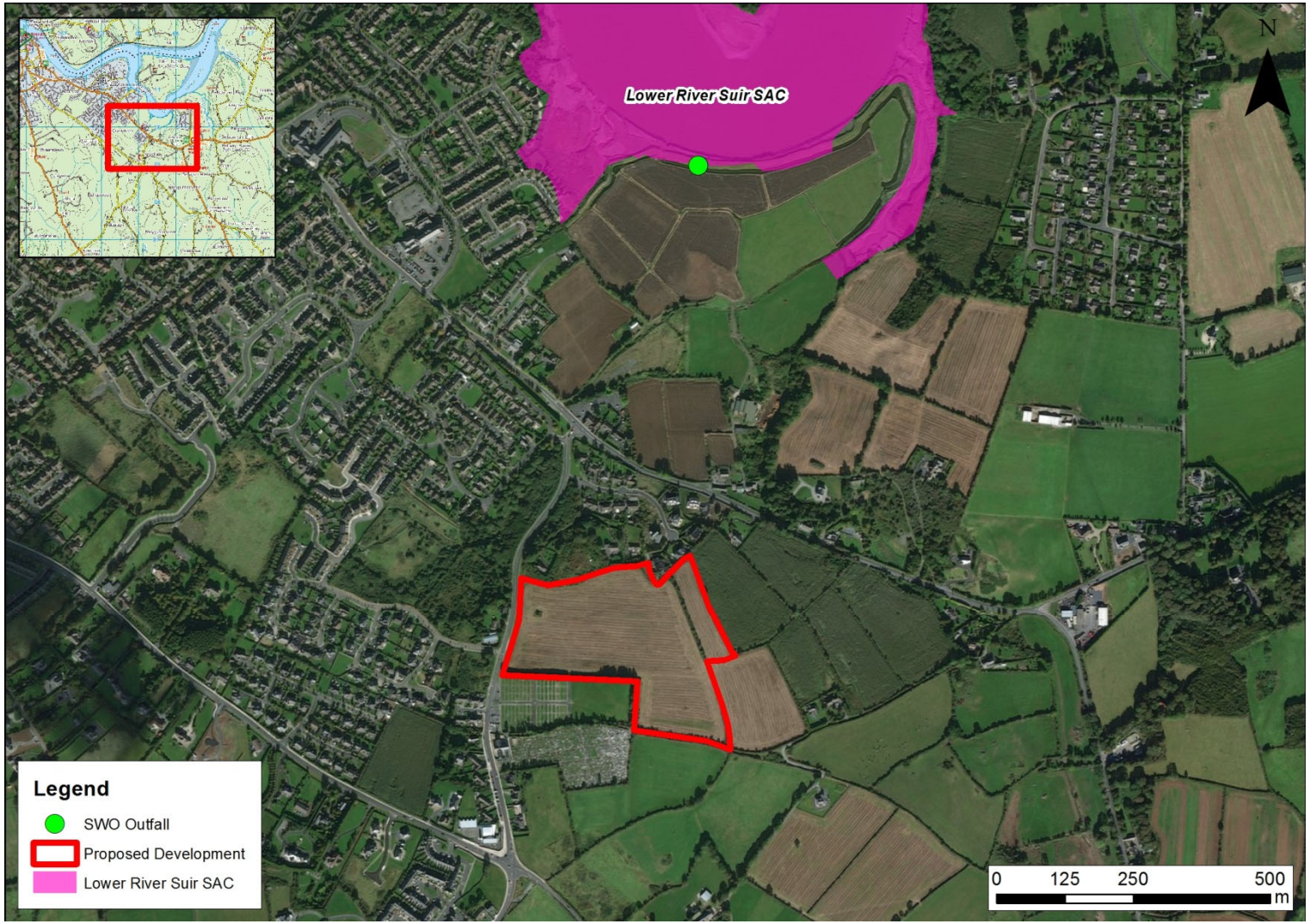


Figure 2-1: Map showing location of proposal in relation to nearby Natura 2000 designated sites

2.2 Proposal Outline

It is proposed to construct 370 residential units and a crèche to accommodate 100 children at the site with foul water connecting to the sewage collection system at St Mary's Place within the drainage catchment of Island View pump station. The pumping station then pumps the sewage via a rising main to Waterford City Waste Water Treatment Plant. The collection system to which the proposed development discharges is a combined sewer network.

A drawing of the foul drainage proposals is included as Appendix A.

In order to provide a high level assessment of the impact on the receiving waters a mass balance assessment has been undertaken based on flows and loadings as outlined in the methodology section below.

3. METHODOLOGY

3.1 Production Rates

The residential loading from the development has been estimated based on 370 residential units with an average occupancy of 2.7 persons resulting in an overall population equivalent of 999. The crèche has been assumed to have a capacity of 100 places with 5 staff and an onsite canteen. The production rates are provided in Table 3.1 and are taken from the British Water Code of Practice for Flows and Loads – 4 for BOD (British Water, 2009) and based on OSPAR nutrient production rates for P and N (OSPAR 2004).

Table 3-1: Table of Loadings for the Development

Parameter	**Residential**		**Crèche**		**Total Annual Load (kg yr^{-1})**
	Production rates standard residential (g $person^{-1}$ day^{-1})	*Annual Load (kg yr^{-1})*	*Production rates (schools, non-residential with cooking on site) (g $person^{-1}$ day^{-1})*	*Annual Load (kg yr-1)*	
Ortho P	2.7	985	2.7	103	1088
BOD	60	21878	38	1456	23334
DIN	9	3282	9	345	3627

3.2 Mass Balance Assessment

The assimilative capacity is the measure of a receiving water's ability to absorb pollutants whilst still maintaining acceptable water quality. In order to determine the assimilative capacity it is necessary to determine the existing water quality status and the acceptable degree to which the existing water quality may be impacted. The assessment of the assimilative capacity provides an indication if a discharge is likely to cause an exceedance of a quality standard, however, it is only indicative and needs to be supported by a mass balance calculation.

Mixing of a discharge with a water body is described by the Mass Balance Equation. The mass balance formula calculates the resultant concentration in the receiving water due to a discharge and is the preferred method of determining the impact on the receiving water. For the purposes of this model the mass balance assessment will adopt the mean flow for the receiving waters, as the SWO will normally only discharge in higher flow conditions.), The flow data in the receiving water has been taken from the EPA Hydrotool modelled fluvial flows at the bottom of the River Suir at Carrick-on-Suir. Given that the discharge location is to transitional water (IE_SE_100_0500 - Lower Suir Estuary (Little Island - Cheekpoint) this is a very conservative approach in that it does not include for any available dilution from tidal flows flushing the estuary throughout the tidal cycle.

The Mass balance formula is shown below:

$$\textit{Mass Balance} = T = \frac{FC + fc}{F}$$

where:

T = resultant concentration of contaminant downstream of the discharge

F = flow in the receiving water upstream of the discharge (m^3/day) (*established from existing EPA flow records & hydrometric data presented via the EPA Hydrotool for fluvial flows only in the River Suir*)

C = concentration of contaminant in the receiving water upstream of the discharge (mg/l) *(calculated from existing ambient monitoring reported in water quality monitoring information available from existing EPA monitoring programmes and derived from catchments.ie)*

f = Effluent discharge rate from SWO (m^3/day) *(based on an assumption that the additional hydraulic load from the proposed development to the collection system is estimated from a production rate 150l/person/day in residential scenarios)* and *that 3% of this hydraulic load is discharged via SWO.*

c = concentration of the contaminant in the discharge (mg/l) *(calculated from the additional load resulting from the development and the estimated flows derived from the hydraulic loading (f) outlined above)*

The flow multiplied by the concentration in the discharge provides the additional load to a water body which when added to the background load provides the overall resultant loading and when divided by

the flows in the receiving water, a concentration is derived which can be compared against the environmental quality standards to make an assessment of the impact.

It will be necessary to demonstrate that the additional loading to the sewage collection system from the development will not impact on the ability of a water body to achieve its environmental quality standards. In this case the assessment will focus on the additional loading to the collection system and its subsequent discharge via the Surface Water Overflows to the Lower Suir Estuary (Little Island – Cheekpoint) transitional water body.

3.2.1 Flow in the receiving Water (F)

Although the discharge from the SWOs is directly to the Lower Suir Estuary transitional waterbody where tidal influences will provide further assimilative capacity, the flows used in the mass balance assessment are based on the fluvial flows only, taken from the most downstream point on the River Suir (just upstream of Carrick-on-Suir town) modelled in the EPA Hydrotool which is a conservative approach as the average flows at the point of discharge of the SWO will be much higher due to tidal influences and therefore provide more assimilative capacity. If the assessment based on the fluvial flows only indicates that there will be no impact from the discharge then it can be concluded that the additional loading from the development will not have a significant impact negating the need for detailed hydrodynamic modelling.

The approach taken is therefore considered as a screening assessment. If the results of this screening assessment suggest that there is the potential for impact further more detailed hydrodynamic modelling would be required.

3.2.2 Background concentration of contaminant in the receiving water upstream of the discharge (C)

The background concentration is based on the WFD monitoring programme for the Lower Suir (Little Island – Cheekpoint). The mean values for the parameters assessed have been derived from the EPA WFD monitoring programme and the ambient monitoring provided in the Annual Environmental Report for the Waterford City Agglomeration.

The background concentrations incorporate the impact of the existing effluent loading via the SWOs. Based on the background concentrations during the winter period, when nutrient levels are typically higher as plant growth is less, the Lower Suir Estuary Transitional water body is considered to be indicative of good status for orthophosphate but is currently indicative of moderate status for Dissolved Inorganic Nitrogen. The environmental objectives for a water body under the WFD are to achieve at least good status and ensure the protected area objectives are achieved.

It should be noted that the characterisation of the water body undertaken by the EPA during the second River Basin Management Cycle has determined that the key pressure for nutrients is from upstream agricultural pressures and the municipal discharges are not listed as a significant pressure

to the achievement of good ecological status in the Lower Suir Estuary. Therefore the high Nitrogen levels are associated with more diffuse pressures upstream of the point of discharge.

3.2.3 Effluent Load from SWO

Due to uncertainties in the hydraulic losses from the Waterford City agglomeration and associated sewer network, only estimates are available in the AER for 2017 estimates, the national approach adopted by the EPA in estimating the contribution of loads to receiving waters from SWOs has been used in this assessment. The loads lost from SWOs are presentative of the flows (f) times the concentration (c) in the mass balance equation with the flows in the receiving water (F) already assumed to incorporate the additional volumes from the activation of the SWO. Therefore the revised mass balance equation is provided below:

$$\textit{Mass Balance} = T = \frac{FC + Load_{untreated}}{F}$$

T = resultant concentration of contaminant downstream of the discharge

F = flow in the receiving water upstream of the discharge (m^3/day) (*established from existing EPA flow records & hydrometric data presented via the EPA Hydrotool for fluvial flows only in the River Suir*)

C = concentration of contaminant in the receiving water upstream of the discharge (mg/l) *(calculated from existing ambient monitoring reported in water quality monitoring information available from existing EPA monitoring programmes and derived from catchments.ie)*

$Load_{untreated}$ *= Additional SWO load as a result of the development*

The Load Apportionment Model (LAM, Mockler *et al., 2017*), developed nationally to apportion average annual loads from different sectors, includes a methodology for estimating nutrient loading from untreated sewage discharged via storm water. This methodology is applied here to estimate the increased loads from the proposed development to surface water due to storm water overflow (SWO) discharges.

As noted in the LAM there are significant uncertainties associated with SWO activation information due to system complexity, and the relative lack of empirical data. Therefore the approach to estimation of loads in untreated sewage discharged via SWOs is based on a percentage loss of the WWTP load where discharge volume from SWOs is unknown (Mockler *et al., 2017*).

$Load_{untreated}$ *= (WWTP Influent Load (kg* yr^{-1}*) / (1 + %LOSS)) * %LOSS*

where:

$Load_{untreated}$ is the untreated sewage load from SWOs based on an assumed loss from the network using a percentage of the WWTP load;

WWTP Influent Load is the value computed from the development PE and a daily PE production figure taken from OSPAR *Guidelines for Harmonised Quantification and Reporting Procedures for Nutrients (OSPAR, 2004) or British Water Code of Practice for flows and Loads (British Water, 2013)*.

%LOSS is the percentage loss of untreated sewage through activation of SWOs and is derived from the latest AER report where available or will be assumed to be 3%, as per Mockler *et al.*, 2017.

This approach has been applied to all the parameters included in this assessment, i.e. BOD, Phosphate and Dissolved Inorganic Nitrogen. The concentration does not take into consideration the dilution effects of storm water in the combined sewer system to ensure that a conservative approach is applied.

Sensitivity testing has also been undertaken to establish the possible impact from the development with an increased loading discharged from the SWO at Island View Pump Station due to the uncertainties associated with SWO activation. The results of the sensitivity testing are presented in Section 4

3.3 Maximum Permissible Increase in Background Concentrations

Where there is assimilative capacity at the point of discharge in a water course, this does not infer that it is acceptable to allow a discharge to utilise the full amount of this capacity. Other downstream discharges may be relying on the dilution effects of the upstream flows to comply with the water quality standards.

In order to assess this increase in concentration, the headroom (difference in concentration between the background concentration and the EQS) should be calculated and the percentage of this headroom utilized by the increase in concentration is calculated. Environmental Quality Standards have been taken from the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009).

The Guidance, Procedures and Training on the Licensing of Discharges to Surface Waters, Groundwater and to Sewer for Local Authorities (Local Authority Services National Services Training Group) states that if the discharge alone will not use >25% of the headroom then the discharge may be permitted.

Headroom calculations are as follows:

$$\textbf{\textit{Headroom} = } C_{max} - C$$

where:

Cmax = EQS

C= Background concentration upstream

Percentage headroom utilized (%) = $\frac{(T-C)x100}{Headroom}$

where:

T is the resultant concentration from the mass balance.

3.4 Assessment of the Potential Impact on Receiving Environment

Mass balance and headroom calculations for the Lower Suir Estuary (Little Island – Cheekpoint) (based on the approach outlined above) have been undertaken to estimate the potential impact on the receiving water and determine if the WFD environmental objectives would be compromised as a result of the development.

4. RESULTS

4.1 Knockboy Proposed Development

The results of the mass balance calculations and the percentage of headroom utilized for all parameters are provided in Appendix B. A summary of the results is presented below in Table 4.1.

The outcome of these calculations confirms that the Lower Suir Estuary would easily provide sufficient assimilative capacity to receive the additional loading from the development, based on the proposals for 370 residential properties and a crèche to accommodate 100 children, should it be discharged as raw sewage in the event that the SWOs at Island View Pump Station were triggered. The increases in concentration in the receiving environment are negligible for all parameters.

These calculations have been derived from measured baseline background concentrations in the Lower Suir Estuary, with assumed flows and loadings derived from the aforementioned available guidance. The additional loading from the development will have an undetectable impact on the receiving water and will not represent any risk to the achievement of the water body's environmental objectives under Article 4 of the Water Framework Directive.

Furthermore the headroom used will not represent a risk to the water body given that it is estimated to be a fraction of 1% in all cases. For DIN the EQS is currently being exceeded due mainly to diffuse pressures. In relation to the DIN EQS values the EPA, through their characterisation of the pressures on this water body, have identified that diffuse pollution from Agriculture is the significant pressure and the main reason for the failure of the EQS. The existing DIN concentrations in the receiving water will not be significantly impacted by the development and this will not result in an increase risk to the achievement of the environmental objectives under the Water Framework Directive.

If it is assumed that diffuse agricultural pressures were addressed and the DIN concentrations in the estuary where indicative of high status the proposed development would not impact on this status

classification and would not increase the risk of a deterioration in water quality from high status to good status.

4.2 Cumulative Impacts

In order to assess any impact from the proposed development in combination with other developments within the area which utilise the same foul sewer collection system, the mass balance assessment has also been undertaken based on the additional estimated population increases and resultant loading from other developments (based on a PE of 999 for the Knockboy proposal and the crèche to accommodate 100 children, plus an additional PE of 2662 from nearby proposed developments) within the drainage catchment area of the Island View pump station.

When the cumulative loading from other proposed developments in the catchment is considered, this results in negligible increases in concentrations in the Lower Suir Estuary and will not impact on the achievement of the environmental objectives for this water body. The results and are also included within Appendix B and summarised in Table 4.1.

As with the Knockboy development assessment, the undetectable increases are a result of the significant dilution provided by the large flows from the River Suir.

4.3 Sensitivity Testing

Sensitivity testing increasing the load and volume of sewage effluent discharged from the SWOs in the sewerage collection system at Island View has been undertaken for the Knockboy development as a standalone development and in combination with other developments in the area that will also be serviced by the sewage collection system. The percentage loss of the additional load from the proposed development, and other developments in the area, from the SWOs was increased to 10% to determine the impact on the receiving waters in the Lower Suir Estuary. The results are presented in Table 4.1 and Appendix B and demonstrate that even with 10% of the loading from the Knockboy development and the cumulative loads from other developments discharging via the SWOs the impact on the receiving water quality will not be significant with the increase in concentration still remaining below 1% with the headroom used also much less than the 25% recommended in the Guidance, Procedures and Training on the Licensing of Discharges to Surface Waters, Groundwater and to Sewer for Local Authorities.

Table 4-1: Summary of the Mass Balance Calculations for key parameters associated with the SWOs at Island View pumping Station

	Knockboy			Cumulative			Sensitivity Testing for Cumulative Load		
	Phosphorous	**BOD**	**DIN**	**Phosphorous**	**BOD**	**DIN**	**Phosphorous**	**BOD**	**DIN**
U/S Mean flow (litres/day)	4,593,024,000	4,593,024,000	4,593,024,000	4,593,024,000	4,593,024,000	4,593,024,000	4,593,024,000	4,593,024,000	4,593,024,000
U/S Background Conc. (mg/l)	0.0325	0.827	2.697	0.0325	0.827	2.697	0.0325	0.827	2.697
Background Load (mg/day)	149,273,280	3,798,430,848	12,387,385,728	149,273,280	3,798,430,848	12,387,385,728	149,273,280	3,798,430,848	12,387,385,728
EQS (mg/l)	0.055	4	1.128	0.055	4	1.128	0.055	4	1.128
1% of EQS (mg/l)	0.0054731	0.4	0.1128	0.0054731	0.4	0.1128	0.0054731	0.4	0.1128
SWO Load from proposed development (mg/day)	86,819	1,862,039	289,398	296,161	6,514,078	987,204	924,382	20,331,818	3,081,273
Mass Balance assessment									
Resultant Concentration	0.0325	0.8274	2.69706	0.0326	0.8284	2.6972	0.0327	0.8314	2.6977
% increase	0.058%	0.049%	0.002%	0.198%	0.171%	0.008%	0.62%	0.54%	0.02%
Headroom calculations									
Headroom available	0.02223	3.17300	-1.56900	0.02223	3.17300	-1.56900	0.02223	3.17300	-1.56900
% headroom utilised	0.09%	0.01%	0.00%	0.29%	0.04%	-0.01%	0.91%	0.14%	-0.04%

5. CONCLUSIONS

The likely impacts that will arise from the additional loading from the development to the SWOs and ultimately to the Lower Suir Estuary have been examined in the context of a number of factors that could potentially affect the attainment of any WFD Objectives. The main risk is associated with the water quality in the Lower River Suir, which is designated as an SAC.

The mass balance assessment indicates that the proposed development will not have an impact on the Lower Suir Estuary, and as such, given the negligible increase in nutrient and BOD concentrations will not impact other nearby Natura 2000 sites, such as the River Nore and River Barrow SAC immediately downstream of the Suir.

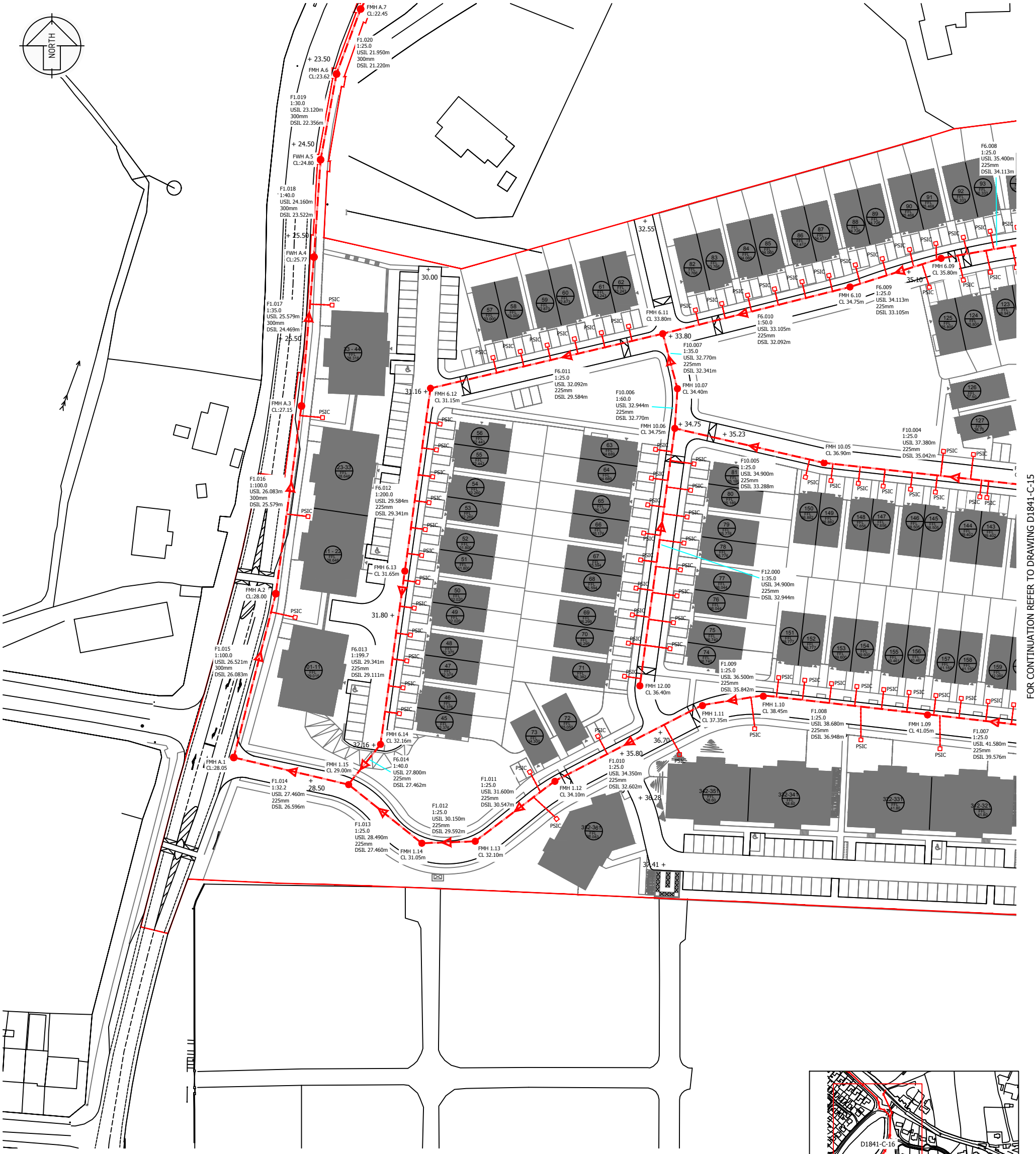
On this basis it is concluded that the proposed development will not have significant effects on the WFD environmental objectives associated with the Lower Suir Estuary, nor is it likely to impact on the qualifying habitats and species of the Lower River Suir SAC or the River Nore and River Barrow SAC.

6. REFERENCES

Mockler, E.M., Deakin, J., Archbold, M., Gill, L., Daly, D., Bruen, M., *2017*. *Sources of nitrogen and phosphorus emissions to Irish rivers and coastal waters: Estimates from a nutrient load apportionment framework.* Science of the Total Environment 601–602 (2017) 326–339.

Appendix A

Proposed Foul Water Drainage Layout



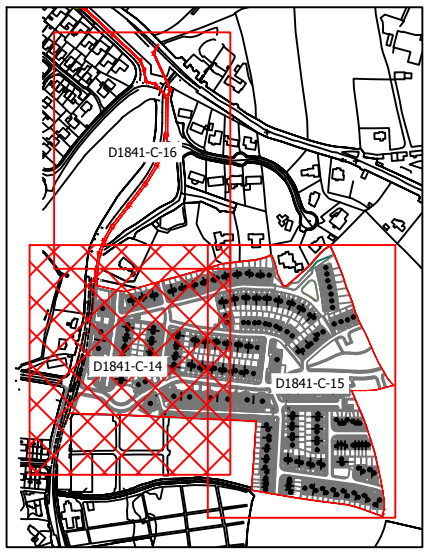
FOR CONTINUATION REFER TO DRAWING D1841-C-15

LEGEND

PROPOSED FOUL DRAIN	
PROPOSED FOUL DRAINAGE MANHOLE	FMH 3.00
PROPOSED PRIVATE SIDE INSPECTION CHAMBER	PSIC
PROPOSED 100mm DIA. INDIVIDUAL FOUL WATER CONNECTION	
SITE BOUNDARY	
PROPOSED ROAD LEVELS AT CHANGE IN GRADIENT	+37.55

NOTES:

1. ALL LEVELS ARE IN METRES UNLESS SHOWN OTHERWISE
2. ALL PRIMARY DRAINAGE DETAILS ARE TO COMPLY WITH THE REQUIREMENTS OF IRISH WATER CODE OF PRACTICE.
3. FOR LONGITUDINAL SECTIONS REFER TO DWG's D1841-C-17 TO D1841-C-22.
4. ALL ON PLOT PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH BUILDING REGULATIONS TECHNICAL GUIDANCE DOCUMENT H.
5. PIPEWORK MATERIAL IS TO BE uPVC. AND IS TO COMPLY WITH SECTION 3.13 OF IRISH WATER CODE OF PRACTICE FOR WASTE WATER INFRASTRUCTURE.



KEY PLAN

DRAFT

NOTES:

REVISION	DATE	DESCRIPTION	REV BY	CHK BY
	11.02.19	ISSUED FOR INFORMATION	SS	SOR

Consulting Engineers
Project Managers

MUIR ASSOCIATES

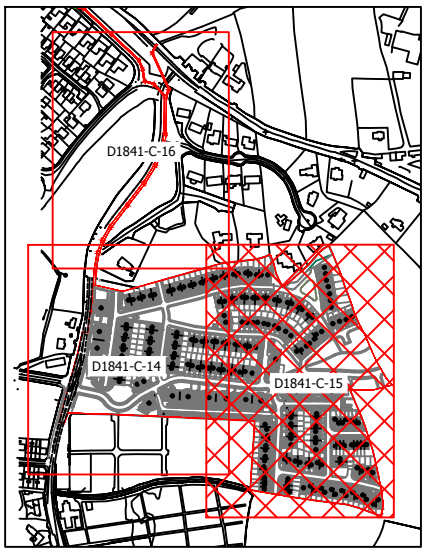
Marketing Network House,
Argyle Square,
Morehampton Road,
Dublin D04 K0Y1, Ireland
Telephone: +353-1-6762788
email: info@muir.ie www.muir.ie

PROJECT	RESIDENTIAL DEVELOPMENT KNOCKBOY WATERFORD
CLIENT	JACKIE GREENE CONSTRUCTION LTD.
TITLE	PROPOSED DEVELOPMENTS FOUL WATER DRAINAGE LAYOUT SHEET 1 (OF 2)

Director	Proj. Eng.	Drawn by	DRG. No.	REV
SOR	SS	KS	D1841-C-14	
Scale	Checked	Date		
1:500 @ A1	SOR	MAR '19		

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

NORTH



KEY PLAN

FOR CONTINUATION REFER TO DRAWING D1841-C-14

F6.008 1:25.0 USIL 35.400m 225mm DSIL 34.113m
F6.009 1:25.0 USIL 34.113m 225mm DSIL 33.105m
F6.007 1:25.0 USIL 37.560m 225mm DSIL 36.000m
F6.006 1:100.0 USIL 38.042m 225mm DSIL 37.741m
F8.002 1:60.0 USIL 38.439m 225mm DSIL 38.042m
F9.000 1:60.0 USIL 38.650m 225mm DSIL 38.439m
F8.000 1:25.0 USIL 40.510m 150mm DSIL 39.491m
F8.001 1:55.0 USIL 39.491m 150mm DSIL 39.247m
F6.004 1:25.0 USIL 41.095m 225mm DSIL 40.454m
F6.005 1:25.0 USIL 40.354m 225mm DSIL 39.868m
F6.003 1:75.0 USIL 41.330m 225mm DSIL 41.095m
F6.002 1:75.0 USIL 41.877m 225mm DSIL 41.330m
F6.001 1:60.0 USIL 43.367m 150mm DSIL 42.979m
F6.000 1:60.0 USIL 43.780m 150mm DSIL 43.367m
F7.000 1:60 USIL 42.500m 225mm DSIL 41.877m
F10.004 1:25.0 USIL 37.380m 225mm DSIL 35.042m
F10.003 1:25.0 USIL 39.880m 225mm DSIL 38.776m
F10.002 1:25.0 USIL 40.750m 225mm DSIL 40.393m
F10.001 1:25.0 USIL 41.820m 150mm DSIL 41.227m
F10.000 1:40.0 USIL 42.160m 150mm DSIL 41.983m
F11.000 1:25.0 USIL 42.500m 150mm DSIL 40.825m
F1.006 1:25.0 USIL 43.350m 225mm DSIL 42.576m
F1.007 1:25.0 USIL 41.580m 225mm DSIL 39.576m
F1.005 1:25.0 USIL 44.709m 225mm DSIL 43.537m
F1.004 1:55.0 USIL 45.068m 225mm DSIL 44.753m
F1.003 1:50.0 USIL 46.519m 225mm DSIL 45.068m
F5.001 1:60.1 USIL 44.904m 225mm DSIL 44.709m
F5.000 1:30.0 USIL 47.240m 225mm DSIL 44.904m
F3.000 1:60.0 USIL 47.860m 150mm DSIL 47.441m
F2.001 1:150.0 USIL 47.366m 225mm DSIL 47.007m
F2.002 1:149.6 USIL 47.007m 225mm DSIL 46.972m
F1.002 1:150.0 USIL 46.972m 225mm DSIL 46.519m
F1.001 1:60.0 USIL 50.040m 225mm DSIL 49.372m
F1.000 1:60.0 USIL 50.900m 225mm DSIL 50.369m
F2.000 1:40.0 USIL 49.850m 150mm DSIL 48.556m
F4.000 1:40.0 USIL 47.410m 225mm DSIL 46.731m

FMH 6.09 CL 35.80m
FMH 6.08 CL 37.50m
FMH 6.07 CL 39.85m
FMH 6.06 CL 41.40m
FMH 6.05 CL 42.05m
FMH 6.04 CL 42.65m
FMH 8.00 CL 42.66m
FMH 6.03 CL 43.20m
FMH 7.00 CL 44.00m
FMH 6.02 CL 45.00m
FMH 6.01 CL 45.22m
FMH 6.00 CL 45.48m
FMH 9.00 CL 40.40m
FMH 8.02 CL 40.70m
FMH 8.01 CL 41.40m
FMH 10.04 CL 40.41m
FMH 10.03 CL 42.07m
FMH 10.02 CL 42.60m
FMH 10.01 CL 43.42m
FMH 10.00 CL 43.85m
FMH 11.00 CL 43.96m
FMH 1.09 CL 41.05m
FMH 1.08 CL 44.05m
FMH 1.07 CL 45.20m
FMH 1.06 CL 46.25m
FMH 1.05 CL 46.70m
FMH 5.01 CL 46.63m
FMH 5.00 CL 48.77m
FMH 4.00 CL 48.94m
FMH 1.03 CL 48.25m
FMH 1.02 CL 51.28m
FMH 1.01 CL 51.925m
FMH 1.00 CL 52.42m
FMH 2.02 CL 51.16m
FMH 2.01 CL 50.07m
FMH 2.00 CL 51.30m
FMH 3.00 CL 49.31m

+ 35.10
+ 40.35
+ 41.40
+ 42.60
+ 44.00
+ 43.50
+ 45.00
+ 45.50
+ 45.93
+ 44.75
+ 45.45
+ 46.23
+ 46.67
+ 48.10
+ 48.83
+ 49.10
+ 48.25
+ 48.94
+ 50.05
+ 51.10
+ 51.30
+ 48.80
+ 48.73
+ 49.55
+ 52.43

ORECHE

LEGEND

- PROPOSED FOUL DRAIN
- PROPOSED FOUL DRAINAGE MANHOLE — FMH 3.00
- PROPOSED PRIVATE SIDE INSPECTION CHAMBER — PSIC
- PROPOSED 100mm DIA. INDIVIDUAL FOUL WATER CONNECTION
- SITE BOUNDARY
- PROPOSED ROAD LEVELS AT CHANGE IN GRADIENT — +37.55

NOTES:

1. ALL LEVELS ARE IN METRES UNLESS SHOWN OTHERWISE
2. ALL PRIMARY DRAINAGE DETAILS ARE TO COMPLY WITH THE REQUIREMENTS OF IRISH WATER CODE OF PRACTICE.
3. FOR LONGITUDINAL SECTIONS REFER TO DWG's D1841-C-17 AND D1841-C-22.
4. ALL ON PLOT PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH BUILDING REGULATIONS TECHNICAL GUIDANCE DOCUMENT H.
5. PIPEWORK MATERIAL IS TO BE uPVC. AND IS TO COMPLY WITH SECTION 3.13 OF IRISH WATER CODE OF PRACTICE FOR WASTE WATER INFRASTRUCTURE.

DRAFT

NOTES:

REVISION	DATE	DESCRIPTION	REV BY	CHK BY
	11.02.19	ISSUED FOR INFORMATION	SS	SOR

Consulting Engineers
Project Managers

MUIR ASSOCIATES

Marketing Network House,
Argyle Square,
Morehampton Road,
Dublin D04 K0Y1, Ireland
Telephone: +353-1-6762788
email: info@muir.ie www.muir.ie

PROJECT	RESIDENTIAL DEVELOPMENT KNOCKBOY WATERFORD
CLIENT	JACKIE GREENE CONSTRUCTION LTD.
TITLE	PROPOSED DEVELOPMENTS FOUL WATER DRAINAGE LAYOUT SHEET 2 (OF 2)

Director	Proj. Eng.	Drawn by	DRG. No.	REV
SOR	SS	KS	D1841-C-15	
Scale 1:500 @ A1	Checked SOR	Date MAR '19		

Appendix B

Mass Balance Calculations

Knockboy Development in isolation

Ortho P

INPUT DATA	P production (g/person/day)	2.7
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Residential Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	58,145
	Existing annual load from residential PE and creche (Kg/yr)	1,088
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.0325
	Background Load (mg/day)	149273280.0
INFLUENT LOADS	Additional Influent load from OSPAR nutrient production figures (kg/yr)	1088
SWO LOADS	SWO Load $_{untreated}$ Default - 3% of total load generated from the development (kg/yr)	31.7
	SWO Load $_{untreated}$ Default - 3% of total load generated from the development (mg/day)	86819
MASS BALANCE CALCS	**Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)**	0.032519
	% increase	0.06%

BOD

INPUT DATA	BOD production (g/person/day)	60
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	58,145
	Existing annual load from residential PE and creche (Kg/yr)	23,334
RECEIVING WATERS	Suir Estuary	
	Meas Flow (m^3/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.827
	Background Load (mg/day)	3798430848.0
INFLUENT LOADS	Additional Influent load from Standard BOD production figures (kg/yr)	23334
SWO LOADS	SWO Load $_{untreated}$ Default - 3% of total load generated from the Treatment Plant (kg/yr)	679.6
	SWO TP Load $_{untreated}$ Default - 3% of total load generated from the development (mg/day)	1862039
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	0.827405
	% increase	0.05%

DIN

INPUT DATA	N production (g/person/day)	9
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	58,145
	Existing annual load from residential PE and creche (Kg/yr)	3,627
RECEIVING WATERS	Suir Estuary	
	Meas Flow (m^3/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	2.697
	Background Load (mg/day)	12387385728.0
INFLUENT LOADS	Additional Influent N load from OSPAR nutrient production figures (kg/yr)	3627
SWO LOADS	SWO Load $_{untreated}$ Default - 3% of total load generated from the Treatment Plant (kg/yr)	105.6
	SWO TP Load $_{untreated}$ Default - 3% of total load generated from the development (mg/day)	289398
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	2.697063
	% increase	0.00%

Knockboy Development Cumulative Assessment

	Ortho P	
INPUT DATA	P production (g/person/day)	2.7
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Residential Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Additional residential PE	2662
	Cumulative PE	3766
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	203,889
	Annual load from residential PE and creche (Kg/yr)	3,711
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.0325
	Background Load (mg/day)	149273280.0
INFLUENT LOADS	Additional Influent load from OSPAR nutrient production figures (kg/yr)	3711
SWO LOADS	SWO Load $_{untreated}$ Default - 3% of total load generated from the development (kg/yr)	108.1
	SWO Load $_{untreated}$ Default - 3% of total load generated from the development (mg/day)	296161.2
MASS BALANCE CALCS	**Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)**	0.032564
	% increase	0.20%

	BOD	
INPUT DATA	BOD production (g/person/day)	60
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Additional residential PE	2662
	Cumulative PE	3766
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	203,889
	Annual load from residential PE and creche (Kg/yr)	81,632
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.827
	Background Load (mg/day)	3798430848.0
INFLUENT LOADS	Additional Influent load from Standard BOD production figures (kg/yr)	81632
SWO LOADS	SWO Load $_{untreated}$ Default - 3% of total load generated from the Treatment Plant (kg/yr)	2377.6
	SWO TP Load $_{untreated}$ Default - 3% of total load generated from the development (mg/day)	6514077.7
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	0.828418
	% increase	0.17%

	DIN	
INPUT DATA	N production (g/person/day)	9
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Additional residential PE	2662
	Cumulative PE	3766
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	203,889
	Annual load from residential PE and creche (Kg/yr)	12,371
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	2.697
	Background Load (mg/day)	12387385728.0
INFLUENT LOADS	Additional Influent N load from OSPAR nutrient production figures (kg/yr)	12371
SWO LOADS	SWO Load $_{untreated}$ Default - 3% of total load generated from the Treatment Plant (kg/yr)	360.3
	SWO TP Load $_{untreated}$ Default - 3% of total load generated from the development (mg/day)	987203.9
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	2.697215
	% increase	0.01%

Knockboy Development Sensitivity Testing (10% loss in Load through SWO)

	Ortho P	
INPUT DATA	P production (g/person/day)	2.7
	OSPAR Guideline No. 4 for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Residential Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	58,145
	Existing annual load from residential PE and creche (Kg/yr)	1,088
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.0325
	Background Load (mg/day)	149273280.0
INFLUENT LOADS	Additional Influent load from OSPAR nutrient production figures (kg/yr)	1088
SWO LOADS	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (kg/yr)	98.9
	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (mg/day)	270981.8
MASS BALANCE CALCS	**Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)**	0.032559
	% increase	0.18%

	BOD	
INPUT DATA	BOD production (g/person/day)	60
	OSPAR Guideline No. 4 for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	58,145
	Existing annual load from residential PE and creche (Kg/yr)	23,334
RECEIVING WATERS	Suir Estuary	
	Meas Flow (m^3/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.827
	Background Load (mg/day)	3798430848.0
INFLUENT LOADS	Additional Influent load from Standard BOD production figures (kg/yr)	23334
SWO LOADS	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (kg/yr)	2121.3
	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (mg/day)	5811818.2
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	0.828265
	% increase	0.15%

	DIN	
INPUT DATA	N production (g/person/day)	9
	OSPAR Guideline No. 4 for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	58,145
	Existing annual load from residential PE and creche (Kg/yr)	3,627
RECEIVING WATERS	Suir Estuary	
	Meas Flow (m^3/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	2.697
	Background Load (mg/day)	12387385728.0
INFLUENT LOADS	Additional Influent N load from OSPAR nutrient production figures (kg/yr)	3627
SWO LOADS	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (kg/yr)	329.7
	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (mg/day)	903272.7
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	2.697197
	% increase	0.01%

Knockboy Development Cumulative Assessment Sensitivity Testing (10% loss in Load through SWO)

	Ortho P	
INPUT DATA	P production (g/person/day)	2.7
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Residential Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Additional residential PE	2662
	Cumulative PE	3766
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	203,889
	Annual load from residential PE and creche (Kg/yr)	3,711
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.0325
	Background Load (mg/day)	149273280
INFLUENT LOADS		
	Additional Influent load from OSPAR nutrient production figures (kg/yr)	3711
SWO LOADS	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (kg/yr)	337.4
	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (mg/day)	924381.8
MASS BALANCE CALCS	**Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)**	0.032701
	% increase	0.62%

	BOD	
INPUT DATA	BOD production (g/person/day)	60
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Additional residential PE	2662
	Cumulative PE	3766
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	203,889
	Annual load from residential PE and creche (Kg/yr)	81,632
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	0.827
	Background Load (mg/day)	3798430848
INFLUENT LOADS		
	Additional Influent load from Standard BOD production figures (kg/yr)	81632
SWO LOADS	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (kg/yr)	7421.1
	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (mg/day)	20331818.2
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	0.831427
	% increase	0.54%

	DIN	
INPUT DATA	N production (g/person/day)	9
	Treatment reduction factor based on *OSPAR Guideline No. 4* for treatment types	1
	SWO present in this agglomeration? - Enter 0 for none or 1 if any present	1
	Development Population Equivalent (PE)	999
	Creche population equivalent (100 child places plus 5 staff	105
	Additional residential PE	2662
	Cumulative PE	3766
	Average Annual Hydraulic Load (Q) from PE (m3/yr)	203,889
	Annual load from residential PE and creche (Kg/yr)	12,371
RECEIVING WATERS	Suir Estuary	
	Meas Flow (litres/day) derived from EPA Hydrotool (F)	4593024000
	Background concentration (C) (mg/L)	2.697
	Background Load (mg/day)	12387385728
INFLUENT LOADS		
	Additional Influent N load from OSPAR nutrient production figures (kg/yr)	12371
SWO LOADS	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (kg/yr)	1124.7
	SWO Load $_{untreated}$ Default - 10% of total load generated from the development (mg/day)	3081272.7
	Mass Balance Calculation Resultant Concentration (T) for SWO Discharge with additional loading from development (mg/l)	2.697671
	% increase	0.02%