11.0 Water Quality

Introduction

11.1 This chapter of the EIAR assesses the effect of the proposed development on water quality and hydromorphology, which has the potential to impact on the Water Framework Directive (WFD) status of identified surface water bodies within the receiving environment. This assessment has been undertaken by Fairhurst and is supported by:

- **Appendix 11.1**: Stranraer Marina Best Practicable Environmental Option (BPEO) Report (Envirocentre, 2025) (**Volume 2**).
- **Drawing 11.1:** Surface Water Environment – Baseline Conditions (**Volume 3**).

11.2 Effects on the water environment in terms of water quality and hydromorphology are closely interlinked with coastal processes, which are fully considered in **Chapter 7** of this EIAR. Effects on the water environment may also result in secondary effects on biodiversity. These are fully considered in **Chapter 12**, **Chapter 13**, **Chapter 14** and **Chapter 15**. This assessment is informed by and inclusive of information further described in these chapters. Effects on ground water quality are considered in **Chapter 21** and are not assessed here.

Competency Statement

11.3 This chapter has been prepared by Jenny Kirkpatrick BSc (Hons), MSc, MCIWEM, C.WEM, CEnv and reviewed by Vanora Ford BEng (Hons) CEng MICE. Jenny has over 10 years' consultancy experience, including extensive experience in carrying out environmental impact assessments (EIAs) in relation to the water environment for a range of projects across the UK. Vanora has over 20 years' experience, including leading water environment EIA in both marine and terrestrial settings.

Legislation, Guidance and Policy

Introduction

11.4 This assessment has been undertaken with reference to the following relevant planning policy, legislation and guidance.

Legislative and Policy Framework

11.5 Many standards for water quality are regulated via European Union (EU) environmental directives, which have since been transposed into Scottish law. The European Union Water Framework Directive 2000/60/EC (WFD)[1] was transposed into Scottish law by the Water Environment & Water Services (Scotland) (WEWS) Act 2003[2]. This legislation controls

[1] EU: Water Framework Directive 2000/60/EC (WFD): 2000
[2] Scottish Government: Water Environment and Water Services (Scotland) Act 2003 (WEWS): 2003

management of the water environment and aims to maintain or improve the physical and chemical quality of all waterbodies by 2027, including coastal waters out to 3 nautical miles.

11.6 This EIA takes into account the requirements of the WFD, as supported by the WEWS Act, the Water Environment (Controlled Activities) (Scotland) Regulations 2011[3] and the Solway Tweed River Basin District River Basin Management Plan (RBMP) 2021[4] update. Other relevant legislation for the proposed development include:

- The Marine (Scotland) Act 2010[5]; which provides provisions for those functions and activities in the marine area, including marine plans, licensing of marine activities, protection of the area and its and regulation of sea fisheries;
- The Water Environment (Shellfish Water Protected Areas: Environmental) (Scotland) Order 2016[6], The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2016[7], and The Scotland River Basin District (Quality of Shellfish protected Areas) (Scotland) Directions 2021[8];
- The Water Environment (Miscellaneous) (Scotland) Regulations 2017[9]; and
- The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019[10]; which provides provision for changes to legislation to ensure that the law remains operable and effective from 1 January 2021.

National Planning Policy Context

11.7 Relevant national planning policy with regard to water quality are listed below:

- National Planning Framework 4 (NPF4)[11];
- UK Marine Policy Statement (2011)[12] ; and
- Scotland's National Marine Plan (2015)[13].

[3] Scottish Government: Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR): 2011
[4] SEPA / EA: Solway Tweed River Basin Management Plan (RBMP) (2021 update): 2021. Available at - https://www.sepa.org.uk/media/594087/211221-final-rbmp3-solway-tweed.pdf
[5] Scottish Government: The Marine (Scotland) Act 2010: 2010
[6] Scottish Government: The Water Environment (Shellfish Water Protected Areas: Environmental) (Scotland) Order 2016
[7] Scottish Government: The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2016
[8] Scottish Government: The Scotland River Basin District (Quality of Shellfish protected Areas) (Scotland) Directions 2021
[9] Scottish Government: The Water Environment (Miscellaneous) (Scotland) Regulations 2017: 2017
[10] Scottish Government: The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019: 2019
[11] Scottish Government: National Planning Framework 4 (NPF4): February 2023. Available at - https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2023/02/national-planning-framework-4/documents/national-planning-framework-4-revised-draft/national-planning-framework-4-revised-draft/govscot%3Adocument/national-planning-framework-4.pdf
[12] HM Government: UK Marine Policy Statement: March 2011. Available at - https://assets.publishing.service.gov.uk/media/5a795700ed915d042206795b/pb3654-marine-policy-statement-110316.pdf
[13] Scottish Government: Scotland's National Marine Plan: A Single Framework for Managing Our Seas: 2015. Available at - https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2015/03/scotlands-national-marine-plan/documents/00475466-pdf/00475466-pdf/govscot%3Adocument/00475466.pdf

Local Planning Policy

Dumfries and Galloway Council Local Development Plan 2 (LDP2)

11.8 Dumfries and Galloway Council (DGC) adopted its current Local Development Plan 2 (LDP2)[14] in October 2019, as detailed in **Chapter 4**. This outlines local authority guidance on protection of the water environment, flooding and drainage. Policies and supplementary guidance of relevance to the water environment include:

- Policy NE11: Supporting the Water Environment;
- Policy NE12: Protection of Water Margins;
- Policy IN8: Surface Water Drainage and Sustainable Drainage System (SuDS);
- Policy IN9: Waste Water Drainage;
- LDP2 Surface Water Drainage and Sustainable Drainage Systems (SuDS), February 2020[15]; and
- LDP2 Stranraer Waterfront Urban Design Strategy and Masterplan Planning Guidance – November 2019[16].

11.9 The planning policy and supplementary guidance support national policy and provide information on local standards and requirements, which have been accounted for in this assessment.

Dumfries and Galloway Shoreline Management Plan

11.10 The Dumfries & Galloway Shoreline Management Plan (D&G SMP)[17] is a plan for managing flood and erosion risk along the D&G coast, looking at the short, medium and long term. Policy Unit 32 within the plan ('McCullochs Point to Innermessan (Stranraer)') includes approximately 7 kilometres (km) of shoreline around the head of Loch Ryan and encompasses the proposed development site at Stranraer Marina.

11.11 The recommended shoreline management policy in this area comprises 'Hold the Line' (i.e. maintaining the existing shoreline position and preventing further retreat by implementing defences or interventions) possibly in combination with 'Managed Realignment' (i.e. landward movement of infrastructure and properties in the future).

[14]DGC: Local Development Plan 2 (LDP2): October 2019. Available at - https://www.dumfriesandgalloway.gov.uk/sites/default/files/2024-07/Adopted_LDP2_OCTOBER_2019_web_version.pdf
[15] DGC: LDP2 Surface Water Drainage and Sustainable Drainage Systems (SuDS): February 2020. Available at - https://www.dumfriesandgalloway.gov.uk/sites/default/files/2024-08/Sustainable_Drainage_Systems_SG_LDP2_Adopted.pdf
[16] DGC: LDP2 Stranraer Waterfront Urban Design Strategy and Masterplan Planning Guidance: November 2019. Available at - https://www.dumfriesandgalloway.gov.uk/sites/default/files/2024-08/Stranraer_Waterfront_Urban_Design_for_LDP2_.pdf
[17] DGC: Dumfries & Galloway Shoreline Management Plan – Main Report: January 2023. Available at - https://www.dumgal.gov.uk/media/27534/SMP-F05/pdf/SMP_F05.pdf

Guidance

11.12 Key guidance in relation to the water environment is summarised in **Table 11-1**; this has been taken into account throughout this assessment.

Table 11-1: Guidance and Best Practice

Source	Guidance

Scottish Environment Protection Agency (SEPA)	• SEPA Controlled Activities Regulations: A Practical Guide, Version 9.4 (2024)
	• SEPA Regulatory Method (WAT-RM-08) Sustainable Urban Drainage Systems Version 6.4 (2019)
	• SEPA Supporting Guidance (WAT-SG-12) – General Binding Rules for Water Run-off and Discharge into Surface Water Drainage Systems Version 5.0 (2022)
	• SEPA Supporting Guidance (WAT-SG-75) – Sector Specific Guidance: Water Run-Off from Construction Sites Version 2.0 (2021)
	• SEPA Supporting Guidance (WAT-SG-26) – Engineering in the Water Environment Good Practice Guide: Sediment Management (2010)
	• SEPA Supporting Guidance (WAT-SG-29) – Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods (2009)
	• Guidance for Pollution Prevention (GPPs):
	  ○ GPP 1: Understanding your environmental responsibilities - good environmental practices
	  ○ GPP 2: Above ground oil storage tanks
	  ○ GPP 3: Use and design of oil separators in surface water drainage systems
	  ○ GPP 5: Works and maintenance in or near water
	  ○ GPP 6: Working at construction and demolition sites
	  ○ GPP 8: Safe storage and disposal of used oils
	  ○ GPP 13 Vehicle washing and cleaning
	  ○ GPP 21: Pollution incident response planning
	  ○ GPP 22: Dealing with spills

Construction Industry Research and Information Association (CIRIA) Guidance	• C741 Environmental Good Practice on Site, 5th Edition (2023) • C532 Control of Water Pollution from Construction Sites (2001) • C609 Sustainable Drainage Systems - Hydraulic, structural and water quality advice (2004) • C753 The SUDS Manual (2015) • C768 Guidance on the Construction of SUDS (2017) • C698 Site Handbook for the Construction of SUDS (2007) • X108 Drainage of development sites - a guide (2004)
Other Guidelines	• SUDS Working Party, Water Assessment and Drainage Assessment Guide (WADAG) • Scottish Water, Sewers for Scotland, v4.0 • British Standards BS6031: 2009 Code of Practice for Earth Works • The Crown Estate, Good Practice Guidance: Extraction by Dredging of Aggregates from England's Seabed (2017)

Methodology Used For Assessment

Introduction

11.13 The baseline condition of the water environment has been established to aid in the identification of sensitive receptors and any likely significant environmental effects resulting from both construction (temporary) and operational (permanent) phases of the proposed development; and to identify mitigation or design measures to reduce, eliminate or offset these effects. Potential effects are assessed taking into account any embedded mitigation designed into the proposed development and additional mitigation is identified as required, e.g. in regards potential construction phase effects. Residual effects are then assessed. The EIA gives proper consideration to sensitive receptors and fully identifies environmental effects and proposed mitigation, for both the public and the determining authority.

Consultation

11.14 Key stakeholders and consultees relating to the water environment include:

- Dumfries & Galloway Council;
- Marine Directorate (formerly Marine Scotland);
- SEPA;
- NatureScot; and
- Scottish Water.

11.15 Consultation responses of pertinence to this chapter are summarised in **Table 11-2**.

Table 11-2: Consultation Responses

Consultee	Consultee Comment	Response
Scottish Ministers / Marine Scotland Licensing Operations Team *Scoping Opinion; Feb 2023*	***5.2 Coastal Processes*** *5.2.4 The Scottish Ministers draw the Applicant's attention to the representation from SEPA regarding the potential for the Proposed Works to cause changes to coastal and sediment transport processes in the adjacent water body upon completion of the works. The Scottish Ministers advise that the Applicant must assess the significance of such alterations and discuss the implications of these with respect to shoreline and seabed morphology, and wider ecosystem health in line with SEPA's River Basin Management Plan objectives.*	See below for original SEPA comment (No.2 and 5) and appropriate responses.
	5.8 Water Quality *5.8.1 The Applicant's consideration of the potential impacts of the Proposed Works on water quality is outlined in Section 6 of the Scoping Report. The Scottish Ministers agree with the proposal to scope in water quality for further assessment in the EIA Report for both construction and operational stages, as detailed in Table 18.1 of the Scoping Report.* *5.8.2 The Scottish Ministers agree with the potential impacts proposed to be scoped in within Section 6.3 of the Scoping Report. Further, the Scottish Ministers acknowledge the Applicant's commitment to consider the Water Framework Directive ("WFD") and potential pollution events within this assessment and direct the Applicant to representation from SEPA which must be fully considered within the EIA Report.*	Paragraphs 11.57 - 11.70 (Construction Effects) Paragraphs 11.73 - 11.84 (Operational Effects)
	5.8.3 The Scottish Ministers highlight the representation from Scottish Water regarding the potential impact of the Proposed Works on existing Scottish Water assets. The Scottish Ministers advise that these comments must be fully considered by the Applicant.	See below for original Scottish Water comment and appropriate response.

Consultee	Consultee Comment	Response
SEPA *Scoping Opinion; May 2022*	***Generic Comments*** *We consider that the following key issues must be addressed in the Environmental Impact Assessment process. To avoid delay and potential objection the following information must be submitted in support of the application.* *1. Scope of the ER for marine developments [see Chapter 1.0]* *2. Water Framework Directive & River Basin Management Planning* *3. Site Layout & Nature of Construction for Marine Development* *4. Marine Ecological Interests [see Chapter 12.0, 13.0 and 14.0]* *5. Coastal Processes* *6. Pollution Prevention & Environmental Management* *7. Flood Risk [see Chapter 10.0]* *8. Onshore Engineering Activities in the Water Environment* *9. Onshore water abstraction* *10. Existing groundwater abstractions [see Chapter 21.0]* *11. Air Quality [see Chapter 17.0]* *While all the issues below should be addressed in the Environmental Report (ER), there may be opportunities for several of these to be scoped out of detailed consideration. The justification for this approach in relation to specific issues should be set out within the ER.*	See below for appropriate response under each detailed comment of pertinence to this chapter.
SEPA *Scoping Opinion; May 2022*	***2. Water Framework Directive & River Basin Management Planning*** *2.4. The Water Framework Directive (WFD) requires considerations of Scotland's water bodies in terms of their chemical, biological and hydromorphological parameters and combines these parameters to score each water body in terms of its status, ranging from bad, through poor, moderate, good to high. A system of River Basin Planning has been put in place to ensure delivery of the WFD and manages the current targets set for each water body in support of Directive targets.* *2.5. Water body data collated in support of the WFD is available on the Marine Scotland website and should be used in assessing any development proposal….This data should form part of the baseline characterisation in the ER.* *2.6. In order to meet the objectives of the Water Framework Directive, coastal development should be designed wherever possible to avoid engineering activities in the marine environment.* *2.7. We recommend that it be demonstrated in the ER that every effort has been made to leave the marine environment in its natural state. There is a need to protect the remaining areas of intertidal zone along some stretches of the developed coastline as these areas have become fragmented and degraded by the coalescence of development in the past.*	Paragraph 11.31 - 11.32 (Water Framework Directive Status) Paragraph 11.51 (Embedded Mitigation) Paragraphs 11.76-11.84 (Operational Effects) Table 11-15 (Summary of Operational Effects)
SEPA *Scoping Opinion; May 2022*	***3. Site Layout & Nature of Construction for Marine Development*** *3.3. Where existing discharges exist in the vicinity of the proposals the ER will need to demonstrate that the development will not result in significant changes to the dispersion characteristics of the receiving waters.*	Paragraph 11.37 - 11.39 (Existing pressures on water quality) Paragraph 11.74 (Permanent physical change altering pollutant dispersal and water quality)
SEPA *Scoping Opinion; May 2022*	***5. Coastal Processes*** *5.1 Depending upon the nature, scale and location of the proposed development the potential exists for there to be changes to coastal and sediment transport processes in the adjacent water body on completion of the development. The ER should assess the significance of such alterations and discuss the implications of these with respect to shoreline and seabed morphology, and wider ecosystem health in line with RBMP objectives. Marine Scotland is the responsible authority for licensing coastal development under the Marine Scotland Act 2010, and therefore we recommend that they be consulted with respect to the scope of any assessments.*	Chapter 7 (Coastal Processes) Paragraphs 11.69 - 11.70 (Construction Effects) Paragraphs 11.76-11.84 (Operational Effects)

Consultee	Consultee Comment	Response
SEPA *Scoping Opinion; May 2022*	***6. Pollution Prevention & Environmental Management*** *6.1. One of SEPA's key interests in relation to major developments is pollution prevention measures during the periods of construction, operation, maintenance, demolition and restoration. The construction phase includes construction of access roads, temporary storage areas and any other site infrastructure.* *6.2. We advise that the applicant should, through the EIA process, systematically identify all aspects of site work that might impact upon the environment, potential pollution risks associated with the proposals and identify the principles of preventative measures and mitigation. This will establish a robust environmental management process for the development. A draft Schedule of Mitigation should be produced as part of this process. This should cover all the environmental sensitivities, pollution prevention and mitigation measures identified to avoid or minimise environmental effects. Please refer to the Pollution prevention guidelines. Other pollution prevention and environmental best practice guidance that may be drawn upon includes that produced by CIRIA.* *6.3. Any application involving large scale beach replenishment and/or dredging works should be cross checked as to whether the proposals lie within or close to a designated bathing water or shellfish growing water. Ideally all physical works should be done outwith the Bathing Water Season (1 June to 15 September) and spatfall periods. Please refer to the Bathing waters section of our website for further guidance on the Bathing Waters Directive (2006/7/EC).* *6.4. A Construction Environmental Management Plan is a key management tool to implement the Schedule of Mitigation. We recommend that the principles of this document are set out in the ER outlining how the draft Schedule of Mitigation will be implemented. This document should form the basis of more detailed site-specific Construction Environmental Management Plans which, along with detailed method statements, may be required by planning condition or, in certain cases, through environmental regulation. Best practice advice developed by The Highland Council (in conjunction with industry and other key agencies) on the Construction Environmental Management Process is available in the guidance note Construction Environmental Management Process for Large Scale Projects.*	Paragraphs 11.57 - 11.68 (Construction Effects) Paragraphs 11.85 - 11.89 (Construction Mitigation / Monitoring) Framework Construction Environmental Management Plan (CEMP)
SEPA *Scoping Opinion; May 2022*	***8. Onshore Engineering Activities in the Water Environment*** *8.1. In order to meet the objectives of the Water Framework Directive, the onshore components of the development should be designed wherever possible to avoid engineering activities in the water environment.* *8.3. A site survey of existing water features and a map of the location of all proposed engineering activities in the water environment should be included in the ER. A systematic table detailing the justification for the activity and how any adverse impact will be mitigated should also be included. The table should be accompanied by a photograph of each affected water body along with its dimensions. Justification for the location of any proposed activity is a key issue for us to assess at the planning stage.* *8.4. Where developments cover a large area, there will usually be opportunities to incorporate improvements in the water environment required by the Water Framework Directive within and/or immediately adjacent to the site either as part of mitigation measures for proposed works or as compensation for environmental impact. We encourage applicants to seek such opportunities to avoid or offset environmental impacts. Improvements which might be considered could include the removal of redundant weirs, the creation of buffer strips and provision of fencing along watercourses. Fencing off watercourses and creating buffer strips both helps reduce the risk of diffuse water pollution and affords protection to the riparian habitat.*	No engineering works are proposed within the onshore water environment, so this is scoped out – Paragraph 11.22 (Effects scoped out of this assessment)
SEPA *Scoping Opinion; May 2022*	***9. Onshore Water Abstractions*** *9.1. Where water abstraction is proposed we request that the ER details if a public or private source will be used. If a private source is to be used the information below should be included. Whilst we regulate water abstractions under CAR, the following information is required at the planning stage to advise on the acceptability of the abstraction at this location:*	No water abstractions are proposed, so this is scoped out – Paragraph 11.22 (Effects scoped out of this assessment)

Consultee	Consultee Comment	Response
	• *Source e.g. ground water, the sea or surface water;* • *Location e.g. grid reference and description of site;* • *Volume e.g. quantity of water to be extracted; Timing of abstraction e.g. will there be a continuous abstraction?;* • *Nature of abstraction e.g. sump or impoundment; Proposed operating regime e.g. details of abstraction limits and hands off flow;* • *Survey of existing water environment including any existing water features;* • *Impacts of the proposed abstraction upon the surrounding water environment.* *9.2. If other development projects are present or proposed within the same water catchment then we advise that the applicant considers whether the cumulative impact upon the water environment needs to be assessed. The ER should also contain a justification for the approach taken.*	
Scottish Water *Scoping Opinion; May 2022*	***Drinking Water Protected Areas*** *A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity.* ***Asset Impact Assessment*** *Scottish Water records indicate that there is live infrastructure in the proximity of your development area that may impact on existing Scottish Water assets.* ○ *Various and large diameter infrastructure in the site boundary* *The applicant must identify any potential conflicts with Scottish Water assets and contact our Asset Impact Team via our Customer Portal for an appraisal of the proposals. The applicant should be aware that any conflict with assets identified will be subject to restrictions on proximity of construction.* ***Surface Water*** *For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system. There may be limited exceptional circumstances where we would allow such a connection for brownfield sites only, however this will require significant justification from the customer taking account of various factors including legal, physical, and technical challenges. In order to avoid costs and delays where a surface water discharge to our combined sewer system is anticipated, the developer should contact Scottish Water at the earliest opportunity with strong evidence to support the intended drainage plan prior to making a connection request. We will assess this evidence in a robust manner and provide a decision that reflects the best option from environmental and customer perspectives.*	Paragraph 11.22 (Effects scoped out of this assessment) Paragraph 11.51 (Embedded Mitigation) Appendix 10.2: Foul and Surface Water Drainage Design Strategy
Marine Scotland Science (MSS) *Scoping Opinion; Jul 2022*	***Physical Environment / Coastal Processes*** *Dredging: During the construction phase the dispersion and fate of sediment plumes from the dredging and reclamation works need to be investigated, especially (but not limited to) if pollutants exist in the sediment.*	Chapter 7 (Coastal Processes) Paragraphs 11.61 - 11.70 (Construction Effects)

Study Area

11.16 The proposed development comprises both land (terrestrial) and marine elements located within the existing Stranraer harbour at the southern end of Loch Ryan. Marine elements will be located within Loch Ryan itself. Land based elements will be located within the area encompassing the West Pier, the existing boat yard, the Breastworks public car park and the existing slipway at Burns House, within the Loch Ryan catchment. The Town Burn outfalls to Loch Ryan adjacent to the existing slipway within the proposed development boundary;

however, this watercourse is culverted below the town centre as far as this outfall and the proposed development is not expected to impact on the WFD status of this water body.

11.17 The spatial extent of this assessment is, therefore, constrained to Loch Ryan, with a focus on the existing harbour area. A 1 kilometre (km) search radius was applied to the proposed development boundary for the purpose of identifying existing discharges with the potential to be affected by any changes in coastal processes (see **Drawing 11.1** (**Volume 3**)). A 5km search radius was also applied for the purpose of identifying additional designated sites outside of Loch Ryan, in order to consider whether degradation of water quality or hydromorphology in the loch may be critical for these sites; for example, in terms of supplementary foraging habitats for designated bird species.

Baseline Conditions

11.18 Baseline conditions have been established via a desktop survey, supplemented by site surveys, in particular to:

- Identify all relevant water features;
- Identify WFD classifications, designated or protected sites and/or sensitive uses;
- Identify existing water quality on-site and downstream of the proposed development, along with existing pressures (e.g. point source and diffuse pollution issues); and
- Identify existing hydromorphological conditions and existing modifications or other pressures.

11.19 Information sources consulted for the baseline are outlined in **Table 11-3.** A site visit was carried out on the 8 October 2024 to verify and augment this information.

Table 11-3: Baseline Information Sources

Topic	Sources of Information
Surface Water Bodies	Ordnance Survey (OS) Mastermap, 1:25,000 and 1:50,000 and OpenMap - Local mapping. Balfour Beatty, 2024. Stranraer Marina Topographic Survey (Drawings CRSSS082-24060-IS-001-1 to 4 SixWest, 2023. Stranraer Channel, Harbour and Marina Bathymetric Survey (Drawing DS230816-1) Scottish Water Asset Plans
Designated Sites, Protected Area and Water Uses	NatureScot Protected Areas Map (https://sitelink.nature.scot/map) NatureScot Open Data Map (https://opendata.nature.scot/datasets/snh::marine-consultation-areas/explore) Scotland's environment mapping (https://map.environment.gov.scot/sewebmap/) Scotland's aquaculture mapping (https://aquaculture.scotland.gov.uk/map/map.aspx) CEFAS/FSA, 2013. Sanitary Survey Report: Loch Ryan DG 191 (https://www.cefas.co.uk/media/4pmha53m/ss-loch-ryan-v10.pdf) Solway Firth Partnership/Dumfries & Galloway Council, 2014. Loch Ryan Management Plan (https://www.solwayfirthpartnership.co.uk/wp-content/uploads/2020/06/Loch-Ryan-Mgt-Plan_May-2014.pdf)

Topic	Sources of Information
Water Quality & Hydromorphology	SEPA DataRequests@sepa.org.uk Dumfries& Galloway Council FOI@dumgal.gov.uk SEPA Water Classification Hub (https://www.sepa.org.uk/data-visualisation/water-classification-hub/) SEPA Water Environment Hub (https://www.sepa.org.uk/data-visualisation/water-environment-hub/) EA/SEPA, 2021. The River Basin Management Plan for the Solway Tweed River basin District (https://www.sepa.org.uk/media/594087/211221-final-rbmp3-solway-tweed.pdf) Solway Firth Partnership/Dumfries & Galloway Council, 2014. Loch Ryan Management Plan (https://www.solwayfirthpartnership.co.uk/wp-content/uploads/2020/06/Loch-Ryan-Mgt-Plan_May-2014.pdf) Shellfish Monitoring and Classification (https://smc.cefas.co.uk/classifications/61220) SEPA, 2011. Loch Ryan shellfish Growing Waters Report (https://www2.sepa.org.uk/shellfish/pdf/6.pdf) Water Technology, Loch Ryan Wastewater Treatment Project, Dumfries and Galloway (https://www.water-technology.net/projects/loch-ryan-wastewater-treatment/) George Leslie, 2011. Loch Ryan Wastewater Treatment Project (https://waterprojectsonline.com/wp-content/uploads/case_studies/2011/Loch-Ryan-WwT-Scheme-2011.pdf) RPS, 2015. Detailed Water Environment Risk Assessment, Former Stranraer Gasworks. For Dumfries and Galloway Council. SAC7188 RPS, 2014. Stranraer Gasworks Remediation Coastal Processes: Initial Phase Detailed Modelling. IBE0677/R04/NS Rev01 Envirocentre, 2025. Best Practicable Environmental Option (BPEO) Report. UKTAG, 2012. TraC-MImAS Technical Report (Development and Review of a TraC Hydromorphology Decision Support Tool for (a) screening proposed new or altered activities/structures for compliance with WFD water body status and (b) classifying TraC waters under the WFD)
Modifying Influences	UK Climate Projections (UKCP18) – (https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index) Sheahan, D. 2021, Impacts of Climate Change on Water Pollution. CEFAS (https://www.mccip.org.uk/sites/default/files/2021-08/pollution-report-from-cefas.pdf)

Impact Assessment Methodology

11.20 The proposed development will introduce potential sources of pollution during both the construction and operational phases, as well as introducing physical changes to Loch Ryan. This includes, but is not limited to, a significant area of reclaimed land within the harbour; an extension to the existing breakwater at the end of the West Pier; new pontoons and a new floating breakwater (and associated piles) as part of the superyacht berth in the Marina; a new quay wall along the Breastworks car park; slipway development works; and dredging of the harbour to facilitate access. Dredge material is intended to be partially disposed of offshore at a licenced dredge disposal site (MA010 North Channel Scotland) at Beaufort's Dyke and partially used within the proposed area of land reclamation within the harbour. Proposals also include a new Coastguard building, SCAMPP building, Boatyard wash down facility, Boatyard workshop, fuel berth, floating toilet block facilities, and black water (i.e. wastewater from toilets) disposal points; all of which have the potential to introduce additional sources of pollution.

11.21 Taking this into account, this chapter of the EIA covers both temporary construction and permanent operational potential effects on:

- Water quality in Loch Ryan; and
- Hydromorphology of Loch Ryan.

11.22 The following effects, as identified in consultation responses, were scoped out of this assessment:

- Effect of Onshore Engineering Activities in the Water Environment:
  - *Reason:* No engineering works are proposed within the onshore surface water environment.
- Effect of Onshore Water Abstractions:
  - *Reason:* No onshore water abstractions are proposed.
- Effect on Scottish Water assets:
  - *Reason:* The EIA Scoping Report (RPS, 2021) identified existing utilities, water and drainage infrastructure as material assets with the potential to be impacted by the proposed development; however, these impacts have been scoped out of the EIA as they can be managed by maintaining good consultation with the relevant utility providers throughout the project.
  - Potential impacts of the proposed development on Scottish Water assets will be mitigated by design, with any connections subject to an independent consenting process (see **Appendix 10.2: Foul and Surface Water Drainage Design Strategy**), and as such are assessed no further within this chapter.

11.23 The significance of the potential effects of the proposed development have been assessed with reference to two main factors; the sensitivity of the receiving environment and the potential magnitude should the effect occur.

Sensitivity of Receptor

11.24 Receptor sensitivity is derived from its baseline quality, importance of associated attributes and ability to absorb an effect. Values have been assigned under the following headings: Water Quality and Hydromorphology. The criteria utilised to define the sensitivity of the receiving environment is defined in **Table 11-4**.

Table 11-4: Sensitivity of Receiving Environment

Receptor Sensitivity	Receptor type
High	**Receptor with a high quality and rarity at international, regional or national scale, with limited potential for substitution.** **Water Quality:** 'High' or 'Good' WFD water quality status; no, or a negligible number of, anthropogenic pressures and/or pollutant sources affecting the water feature; and/or water purity of importance to internationally or nationally designated sensitive ecosystems (e.g. SSSI/SPA or other protected area where designation is based specifically on feature under consideration) and/or critical or locally important social and economic uses. **Hydromorphology:** 'High' or 'Good' WFD hydromorphology status; no, or negligible engineering works that do not significantly affect the water feature; and/or loch bed/shoreline habitats of importance to internationally or nationally designated sensitive ecosystems (e.g. SSSI, SPA, where designation is based specifically on feature under consideration).
Medium	**Receptor with a medium quality and rarity at a regional scale or good quality at local scale, with limited potential for substitution.**

Receptor Sensitivity	Receptor type
	Water Quality: 'Moderate' WFD water quality status or not classified by SEPA. Likely to have deteriorated in water quality as a result of anthropogenic pressures and/or pollutant sources, Some but limited importance to sensitive ecosystems and/or social and economic uses. **Hydromorphology:** 'Moderate' WFD hydromorphology status; likely to have deteriorated in status as a result of engineering works in or near the waterbody; and/or some but limited loch bed/shoreline habitats of importance to regionally sensitive ecosystems.
Low	**Receptor with poor or variable quality and rarity at local scale with potential for substitution/replacement.** **Water Quality:** ''Poor/Bad' WFD water quality status. Highly likely to be affected by anthropogenic pressures and/or pollution sources. Minimal water purity importance to sensitive ecosystems and/or social and economic uses. **Hydromorphology:** 'Poor/Bad' WFD hydromorphology status; highly likely to have deteriorated in status as a result of engineering works in or near the waterbody. Heavily engineered or artificially modified features. Limited loch bed/shoreline habitats of little to no biodiversity importance.

Magnitude of Impact

11.25 The magnitude of an impact includes the probability, timing, scale, size, duration and/or frequency and reversibility of the potential effect. The criteria utilised to define the magnitude of impact are detailed in **Table 11-5**.

Table 11-5: Magnitude of Impact

Magnitude	Description
High	**An impact, which completely removes sensitive characteristics i.e. total loss or major alteration to key elements from baseline (i.e. pre-development) conditions.** **Water Quality:** A major shift away from baseline conditions with a likely reduction in overall WFD class; potential loss or extensive change to associated designated site(s) or protected area(s). **Hydromorphology:** Major engineering works in or near the waterbody, impacting significant areas of the water body. Works which are likely to significantly disturb the loch bed or shoreline and impact on associated habitats, and/or are likely to cause a drop in hydromorphology WFD status.
Medium	**An impact, which alters the character of the environment in a manner that is consistent with the existing and emerging trends, including partial loss or alteration to key elements from baseline conditions.** **Water Quality:** A moderate shift away from baseline conditions with potential to result in a downgrade in overall WFD status. **Hydromorphology:** Moderate level of engineering works in or near the waterbody. Works which have the potential to significantly disturb the loch bed or shoreline on a greater than local scale and/or have the potential to cause a drop in hydromorphology WFD status.
Low	**An impact, which causes noticeable changes in the character of the environment without affecting its sensitivities i.e. minor shift away from baseline conditions.** **Water Quality:** A minor shift away from baseline conditions unlikely to result in a downgrade in overall WFD status. **Hydromorphology:** Little engineering works in or near the waterbody. Works which have a local impact only with some minimal disturbance to the loch bed or shoreline.
Negligible	**An impact capable of measurement but without noticeable consequences, i.e. very slight or no alteration from baseline, insufficient magnitude to affect use/integrity.** **Water Quality:** No measurable change in water quality and/or no risk. **Hydromorphology:** Little or no engineering works in or near the waterbody. Works which have a local impact only with minimal to no disturbance to the loch bed or shoreline.

Significance of Effect

11.26 The sensitivity of the receiving environment together with the magnitude of impact, as set out above, defines the significance of the effect, as detailed in **Table 11-6**. A higher level of

significance is attached to all effects on highly sensitive receptors, whilst a high magnitude effect on a low sensitivity receptor is generally considered to be of less significance. Significance is, however, not absolute and selection is based on professional judgement defined in relation to individual assets, their context and location.

Table 11-6: EIA Matrix - Assigning significance of Effect

Sensitivity	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible**
High	Substantial	Moderate/ Substantial	Slight/ Moderate	Negligible
Medium	Moderate/ Substantial	Moderate	Slight	Negligible
Low	Moderate	Slight/ Moderate	Negligible/ Slight	Negligible

11.27 For the purpose of this EIA, potential effects are concluded to be Substantial, Moderate, Slight or Negligible. Effects considered as being Moderate or Substantial are considered to be significant. Effects considered as being Slight/Moderate or below are not considered to be significant.

Limitations to Assessment

11.28 The information presented in this assessment is based on desk studies, a site survey carried out on the 8 of October 2024 and sediment sampling and testing detailed in **Appendix 21.1: Geo-Environmental and Geotechnical Interpretative Report**; as well as additional sampling and contaminant testing of the proposed dredge material carried out to inform the marine licence application and dredge disposal options – as detailed in BPEO Report (**Appendix 11.1**). The assessment of effects has been made on the basis of the Project Masterplan provided in **Drawing 161378-FRH-00-00-DG-Z-000001 S1 P02.1 (Volume 3)** and the project description provided in **Chapter 2**, with the assumption that there will be no movement of infrastructure or changes in design which could result in higher impacts than identified herein.

Baseline Conditions

Introduction

11.29 Loch Ryan is a predominantly shallow, sheltered sea loch, which opens into the Firth of Clyde and the Atlantic Ocean to the north (see **Drawing 11.1** (**Volume 3**)). This coastal water body is approximately 42 square kilometres in area (km^2). Review of the OS Mean Low Water Spring (MLWS) line indicates that approximately 38km^2 of the water body is subtidal (below MLWS) and approximately 4km^2 is intertidal (between MLWS and Mean High Water Spring, MHWS). The loch is 13.4km long from north to south,4.8km wide at its widest point and incorporates an approximately 37km shoreline around its perimeter (as defined by MHWS). The loch ranges typically between 0 and 10 metre (m) in depth, with much of it shallower than 5m[18].

11.30 Loch Ryan receives direct runoff from a 197km^2 catchment area. This incorporates the town of Stranraer on the southern shores of the loch and other smaller settlements around the loch, including Leswalt and Kirkcolm on the west and Cairnryan on the east. The remaining land surrounding the loch comprises mainly agricultural use, as well as caravan and camping holiday parks. The ratio of freshwater to tidal flow is low and so the run off from the surrounding catchments is considered to have a very small influence on this water body[19].

Water Framework Directive Status

11.31 SEPA produce an annual WFD classification for waterbodies based on an aquatic classification system covering rivers (with catchments greater than 10km^2), lochs (bigger than 0.5km^2), estuaries, coastal waters (out to three nautical miles) and groundwater bodies. Waterbodies are classified according to set criteria relating to the chemistry, hydrology, morphology and ecology of the waterbody. Surface waterbodies are assessed as being of overall 'High', 'Good', 'Moderate', 'Poor' or 'Bad' status. In general, the classification describes how much their condition or status differs from natural conditions.

11.32 Loch Ryan falls within the Solway Tweed river basin district, and its current condition and future objectives are detailed in **Table 11-7**. The most recent classification reporting data (2022) is detailed in **Table 11-8**. A review of the baseline data suggests that Loch Ryan is currently meeting its WFD Objectives by achieving Good overall status.

Table 11-7: Loch Ryan (ID: 200011) Current Condition & Future Objectives[20]

Parameter	Current	Future Objectives	
	2020	2027	Long Term
Overall	Good	Good	Good
Water Quality	High	High	High
Physical Condition	High	High	High
Freedom from Invasive Species	Good	Good	Good

[18] CEFAS / FSA, 2013. Sanitary Survey Report: Loch Ryan DG 191 – Available at: https://www.cefas.co.uk/media/4pmha53m/ss-loch-ryan-v10.pdf
[19] SEPA, 2011. Loch Ryan shellfish Growing Waters Report – Available at: https://www2.sepa.org.uk/shellfish/pdf/6.pdf
[20] SEPA Water Environment Hub – Available at: https://informatics.sepa.org.uk/RBMP3/

Table 11-8: Loch Ryan (ID: 200011) Reporting Data (2022)[21]

Parameter	2022 Status
Overall Status	Good
Pre-HMWB Status	Good
Overall ecology	Good
Physico-Chem	High
Dissolved Oxygen	High
Dissolved inorganic nitrogen	High
Biological elements	Good
Invertebrate animals	High
Imposex assessment	High
Benthic invertebrates (IQI)	High
Alien species	Good
Macroalgae	High
Macroalgae (FSL)	High
Macroalgae (RSL)	Good
Phytoplankton	High
Specific Pollutants	Pass
Unionised ammonia	Pass
Hydromorphology	High
Morphology	High
Water quality	High

Designated Areas

11.33 Loch Ryan contains Scotland's largest native oyster bed and is designated as a Shellfish Water Protected Area (SWPA) under The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2016[7]. There is a commercial interest in harvesting native oyster and part of Loch Ryan is a Classified Shellfish Harvesting Area, currently operated by The Loch Ryan Oyster Fishery Co Ltd. The native oyster bed reportedly covers the majority of the shallow (<5m) basin; with fishing occurring on both east and west shores south of Cairnryan[18].

11.34 Loch Ryan has also been designated as a Marine Consultation Area (MCA) in view of the habitats that it contains and the presence of good examples of native oyster[22]. Marine Consultation Areas are non-statutory areas identified by NatureScot as deserving particular distinction in respect of the quality and sensitivity of the marine environment within them. Their selection encourages coastal communities and management bodies to be aware of marine conservation issues in the area.

11.35 The nearest identified Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA) designations are upstream of, and remote from, Loch Ryan and so water quality and

[21] SEPA Water Classification Hub – Available at: https://informatics.sepa.org.uk/WaterClassificationHub/
[22] Solway Firth Partnership / Dumfries & Galloway Council, 2014. Loch Ryan Management Plan – Available at: https://www.solwayfirthpartnership.co.uk/wp-content/uploads/2020/06/Loch-Ryan-Mgt-Plan_May-2014.pdf

hydromorphology within the Loch has no direct impact on these areas (see **Drawing 11.1** (**Volume 3**)). These include Glen App and Galloway Moors SPA and SSI, ~5km east of the study area; Loch of Inch and Torrs Warren SPA and White Loch – Lochinsh SSSI , >4km east of the study area; and Auchrochar Wetlands SSSI, ~3km east of the study area.

Water Quality

11.36 The overall WFD status of Loch Ryan increased from Moderate in 2012 to Good in 2013, with water quality status increasing from Good in 2013 (first record of overall water quality classification) to High in 2015, where it has remained to date[21]. Additionally – as part of the SWPA designation – Food Standards Scotland (FSS) sample, analyse and report on water quality in production areas throughout the year, to ensure shellfish are safe for consumption. Oysters are bivalve filter feeders, and accumulate any pollutants that are present within their habitat, such as heavy metals, sewage derived bacteria and viruses. As such they are an important biological indicator of the overall water quality within Loch Ryan[22]. The FSS categorises production areas from A to C, with Category A reflecting the best water quality conditions. The latest available overall categorisation is A/B (for April 2024 to March 2025)[23]. Category A means that shellfish can go directly for human consumption, whilst Category B requires that shellfish be depurated, heat-treated or re-laid prior to human consumption.

11.37 Existing pressures on water quality include sewage discharges and urban runoff from surrounding towns, villages and holiday parks. However, the Loch Ryan Waste Water Treatment Works (WWTWs) were constructed circa 2013[24] to provide primary and secondary treatment of flows from Stranraer, Leswalt and Kirkcolm and to transfer final effluent to the Irish Sea, removing completely the permanent foul effluent discharge to Loch Ryan within the vicinity of the harbour[25]. A new WWTW was also constructed at the Stena ferry terminal at Cairnryan to treat effluent from the village. This discharges to Loch Ryan, however, incorporates tertiary treatment to minimise the effect on water quality. This is also located over 8km north of Stranraer harbour.

11.38 Remaining discharges are from intermittent combined sewer overflows, septic tanks and holiday parks. A request was submitted to SEPA in regards existing discharges within the study area, which identified the following discharges to Loch Ryan: the Lewis Street Combined Sewer Overflow (CSO) (National Grid Reference (NGR) NX 06120 61540) approximately 180m north east of the site to the east of the East Pier, the Beechmount Road CSO (NGR NX 06750 60960) approximately 435m south east of the site beyond the East Pier, and the Foreland Place CSO (NGR NX 05530 61480) approximately 415m north west of the site beyond the West Pier (see **Drawing 11.1** (**Volume 3**)). These comprise intermittent screened

[23] Shellfish Monitoring and Classification – Available at https://smc.cefas.co.uk/classifications/61220
[24] Water Technology, Loch Ryan Wastewater Treatment Project, Dumfries and Galloway – Available at https://www.water-technology.net/projects/loch-ryan-wastewater-treatment/
[25] George Leslie, 2011. Loch Ryan Wastewater Treatment Project – Available at https://waterprojectsonline.com/wp-content/uploads/case_studies/2011/Loch-Ryan-WwT-Scheme-2011.pdf

discharges only. There is also potential for overboard discharges from fishing boats and yachts using the Stranraer anchorage.

11.39 In addition to point discharges, there is also potential for diffuse pollution from surrounding land – particularly from former industrial sites within the harbour. Contaminated land has been identified at the former Stranraer Gasworks site within the harbour (see **Drawing 11.1** (**Volume 3**)) – which has resulted in elevated levels of Cadmium, Ammoniacal Nitrogen, Cyanide, Phenol, PAHs, BTEX and Aromatic and Aliphatic hydrocarbons within the underlying groundwater[26]. These pollutants have the potential to leach through the seawall into the adjacent harbour and ultimately to impact upon the water quality in Loch Ryan. However, levels of contamination in groundwater were proven by coastal dilution modelling to not pose a risk to the water environment[27], with the most onerous levels of contamination undergoing satisfactory dilution within the mixing zone to meet acceptable quality standards in Loch Ryan.

Sediment Quality

11.40 Harbours can be hotspots of contaminant accumulation and so disturbance of sediment within the loch has the potential to impact on water quality via mobilisation of contaminants, as well as increases in turbidity and potential depletion of dissolved oxygen. Under baseline conditions sediment disturbance in the harbour area is expected to have reduced since the relocation of the Stranraer Ferry Terminal to Cairnryan in 2011. Prior to this, fast and frequent ferry activity occurred within the harbour and routine dredging works were carried out to maintain access.

11.41 Ground investigation (GI) including sediment sampling has been carried out, and is fully detailed in **Appendix 21.1: Geo-Environmental and Geotechnical Interpretative Report**; additional sampling to inform Marine Licence requirements and dredge disposal options is detailed in the BPEO Report (**Appendix 11.1**). GI indicates that offshore sediments comprise a mixture of marine and glacial deposits, with both granular and cohesive layers present. These comprise sands, silts and clays throughout the harbour area, with some gravels present in marine granular deposits. Marine deposits include some organic components, however, the maximum soil organic matter (SOM) within recovered offshore samples was only 0.53%.

11.42 There are no formal quantitative environmental quality standards (EQS) in the UK for the concentration of contaminants in sediments; however, the Marine Directorate identify a series of Action Levels in regards contaminant concentrations – with material below Action Level 1 (AL1) typically suitable for disposal at sea and above Action Level 2 (AL2) typically unsuitable for disposal at sea. Analysis of contaminant concentrations identify local exceedances of AL1 for a number of trace metals (namely Cadmium, Chromium, Copper and Zinc) and Polyaromatic Hydrocarbons (PAHs), and consistent exceedances of AL1 for Nickel at all sampling locations. One exceedance of AL2 for Nickel was identified within deeper cohesive

[26] RPS, 2015. Detailed Water Environment Risk Assessment, Former Stranraer Gasworks. For Dumfries and Galloway Council. SAC7188
[27] RPS, 2014. Stranraer Gasworks Remediation Coastal Processes: Initial Phase Detailed Modelling. IBE0677/R04/NS Rev01

glacial deposits. Further analysis of high concentrations of Nickel within this horizon indicates that this is likely to be naturally occurring as a result of geological influences (**Appendix 11.1**). No other exceedances of AL2 were identified for any tested contaminant – with all exceedances of AL1 remaining well below this second Action Level.

Hydromorphology

11.43 Hydromorphology considers the physical character of a water body, which is a critical influence on the health of aquatic ecosystems (i.e. physical habitat availability for biota such as fish, invertebrates and aquatic macrophytes). In coastal water bodies, hydromorphology is typically controlled by flow regimes, substrate characteristics, sediment transport processes and the shape and structure of the seabed and shoreline – all of which can be influenced by natural and anthropogenic activities.

11.44 The latest available physical condition and hydromorphology WFD status for Loch Ryan is High due to the low level of anthropogenic modification on a water body scale. Existing hydromorphological pressures within the vicinity of Stranraer harbour include reclaimed land between Sheuchan Street and the East Pier, along the Stranraer seafront; the West and East Piers, and associated support structures, which project into the harbour; and the existing breakwater immediately north of the West Pier (see **Photograph 11-1**). A channel was also historically dredged to 7m to allow access for ferries to the East Pier; however, major dredging has ceased since the relocation of the ferry terminal to Cairnryan.

Photograph 11-1: Existing infrastructure in the harbour

Receptor Sensitivity

11.45 Following establishment of the baseline conditions for the water environment in the study area; key identified receptors are assigned a sensitivity in regards water quality and/or

hydromorphology (as appropriate) in **Table 11-9**, alongside justification for this categorisation based on the criteria outlined in **Table 11-4**.

Table 11-9: Receptor Sensitivity

Receptor	Sensitivity	Justification
Loch Ryan Water Quality	High	High water quality WFD status in 2022 and Good overall WFD status; inherent connectivity with Shellfish Water Protected Area.
Loch Ryan Hydromorpholgy	High	High hydromorpholgy WFD status in 2022 and Good overall WFD status; inherent connectivity with Shellfish Water Protected Area and associated oyster beds.

Future Baseline

11.46 Hydrological systems are constantly varying due largely to climate patterns, which impact primarily rainfall patterns, and land use, which impacts runoff/infiltration patterns and coastline evolution.

11.47 Information regarding climate change was obtained from the UK Climate Projections (UKCP18) website[28]. UKCP18 is a climate analysis tool which features comprehensive projections for different regions of the UK. For West Scotland warmer, wetter winters and hotter, drier summers are predicted; along with significant sea level rise. UKCP18 also suggests future increases in the intensity of heavy summer rainfall events and significant rises in sea levels.

11.48 More extreme rainfall events may lead to increased volumes of contaminated storm water discharging to coastal water bodies, increased discharges of untreated sewage effluent from combined sewer overflows, and increased leaching of pesticides or other contaminants from coastal catchments[29]. Rising sea levels will result in an increased risk of coastal flooding, which in turn increases the risk of onshore pollutants/contaminants being mobilised in floodwater and reaching the marine environment. Higher temperatures may increase the speed of biodegradation of chemicals in water, reducing toxic effects. However, higher temperatures could also increase the rate of chemical accumulation by aquatic organisms.

11.49 The morphological conditions of Loch Ryan also have the potential to evolve overtime as a result of ongoing coastal processes. The D&G SMP[17] notes that Loch Ryan is sheltered, and that the short fetch associated with this sea loch and the bathymetry/topography of the loch restrict the wave conditions at the shoreline within the vicinity of Stranraer. However, more frequent and intense storm events have the potential to increase wave action, accelerating coastal erosion. Rising sea levels have the potential to exacerbate this further, as a result of an associated increase in the area exposed to waves and storm surges. Natural morphological changes, therefore, have the potential to occur in future. However, the D&G SMP recommends

[28] United Kingdom (UK) Climate Projections (UKCP18) – Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index
[29] Sheahan, D. 2021, Impacts of Climate Change on Water Pollution. CEFAS Available at: https://www.mccip.org.uk/sites/default/files/2021-08/pollution-report-from-cefas.pdf

a ‘Hold the Line’ approach to maintain the existing shoreline position. It is expected that, in the absence of the proposed development, physical interventions would be made along the Stranraer shoreline to achieve this.

Impact Assessment

Introduction

11.50 This section summarises the potential effects of the proposed development on identified receptors from activities during the construction and operational phases, taking into account any embedded mitigation designed into the project.

Embedded Mitigation

11.51 Embedded mitigation has been designed into the proposed development and it is considered that the final development design and site layout suitably manages potential environmental effects. Embedded mitigation of relevance to potential effects on water quality and hydromorphology includes:

- **Siting and Design:**
  - The inherent nature of the proposed development requires engineering activities within the marine environment. However, siting and design has been informed by coastal modelling, which has allowed development of a design which minimises impacts on coastal processes within Loch Ryan (see **Chapter 7**). Proposed engineering works have also been concentrated within the existing heavily modified harbour area, with no engineering works proposed in untouched areas of Loch Ryan.
  - Physical changes to the water body have been minimised by utilising a floating breakwater and a local extension to the existing breakwater to provide required wave attenuation, rather than constructing extensive new offshore breakwaters or causeways on the seabed (see **Chapter 3**).
  - The design intends to partially utilise dredge material within the proposed area of land reclamation within the harbour, subject to this material meeting geotechnical requirements. The reclaimed land will comprise a revetment wall, which will be constructed to isolate the area from the sea, and the area behind will then be backfilled to create a new carpark and community space. The contaminant levels in dredge material are considered suitable for re-use as part of proposed land reclamation works (see **Chapter 21**). Prior to re-use, it is expected that dredge materials will be treated to allow it to be placed in a controlled manner. This is expected to bind any contaminants that are present and prevent future release. The revetment wall is also expected to incorporate a geo-filter to prevent the washout of fines. This approach allows partial re-use of dredged material onshore, with the remainder to be deposited at a licenced dredge disposal site (MA010 North Channel Scotland) at Beaufort's Dyke (NGR NW 87976 61155) in the North

Channel of the Irish Sea. This avoids physical changes and water quality impacts associated with redistribution of dredge material within Loch Ryan[30].

- Appropriate surface water and foul water drainage strategies will be incorporated into terrestrial areas of the proposed development (detailed further below) to manage surface water runoff and foul water discharges. This will include new black water disposal points, which should mitigate potential increases in overboard discharges associated with expected increases in boat traffic resulting from the proposed development.
- All proposed facilities with potential to introduce new pollutant sources along the loch edge (e.g. fuel berth, chemical storage for wash bays, floating toilet block and black water disposal points) are expected to be designed in line with relevant guidance incorporating appropriate measures to mitigate the risk of accidental spillage or leaks to the water environment. This is expected to include appropriate bunding, non-return valves, and flood resilience in line with requirements detailed in **Appendix 10.1: Flood Risk Assessment**.

- **Surface Water Drainage Strategy:**
  - Surface water drainage for terrestrial areas of the site will make use of existing surface water networks where possible, which currently discharge to Loch Ryan. The drainage strategy includes for:
    - Remedial works to improve existing drainage systems in the existing Breastworks car park area;
    - Extension of existing drainage outfalls beyond the new quay wall/ areas of reclaimed ground to new tidal outfalls where required; and
    - New surface water drainage systems in the area of reclaimed land/serving proposed buildings.
  - The surface water drainage design has been assessed in **Appendix 10.2: Foul and Surface Water Drainage Design Strategy**. The proposals are intended to represent existing drainage discharge rates on a like-for-like basis and will continue to discharge to Loch Ryan, with suitable pollution treatment measures incorporated where required in line with SEPA's Supporting Guidance WAT-SG-12[31].
  - Pollution treatment measures are expected to include the use of permeable paving and/or filter trenches in proposed new car parking areas in the area of reclaimed land, which will aid in filtering pollutants from stormwater prior to discharge. Run-off from proposed Boatyard wash down facilities will be directed to onsite treatment and discharged to combined sewers when the

[30] This assessment considers impacts associated with both local re-use of dredge material and offshore disposal of dredge material. However, should all material be required to be disposed offshore (i.e. if it does not meet geotechnical requirements for re-use), the overall magnitude of impact is not expected to deviate from that assessed for partial offshore disposal.
[31] SEPA, 2022. Supporting Guidance WAT-SG-12 (General Binding Rules for Water Run-off and Discharge into Surface Water Drainage Systems)

wash down facility is in use, to avoid trade effluent discharging to the surface water environment.

- The final drainage design will be developed in consultation with DGC, to identify any discharge constraints in regards new coastal outfalls, and Scottish Water, with alterations / additional discharges to the existing sewer network subject to their acceptance. Scottish Water have confirmed that there is sufficient capacity in the network for the proposed surface discharge, assuming this will outfall to Loch Ryan (see **Appendix 10.2**). The implementation of this drainage strategy will mitigate adverse effects on the water environment from runoff in terrestrial areas of the site.

- **Foul Water Drainage Strategy:**
  - New foul water facilities associated with the proposed development will include:
    - Foul or trade effluent discharge from the Coastguard building, SCAMPP building, Boatyard wash down facility and Boatyard workshop, with onsite treatment of runoff from wash bays;; and
    - A floating toilet block and black water disposal point on the pontoon, served by a new pumping station.
  - The foul water drainage design has been assessed in **Appendix 10.2: Foul and Surface Water Drainage Design Strategy**. This will be designed in accordance with Scottish Water guidelines and will discharge to the existing Scottish Water combined sewer network, to be conveyed to the Loch Ryan Waste Water Treatment Plant. Scottish Water have confirmed that there is sufficient capacity in the network for the proposed foul discharge (see **Appendix 10.2**). This design will prevent new foul water facilities from adversely affecting the surrounding water environment.

Construction Phase

11.52 Although the construction phase of the project will be short term compared to the operational phase, the risk of pollution and damage to the water environment during this phase can be high due to the levels of activity onsite and associated high risk of sediment mobilisation and of accidental spillage of pollutants.

11.53 Disturbance and mobilisation of sediments as a result of construction works has the potential to increase Suspended Sediment Concentrations (SSCs) in the water column. This could result from the mobilisation of sediment from onshore construction areas (e.g. workshop/compounds/car parking works) and/or as a result of physical construction in offshore areas (e.g. seawall/revetement/breakwater extension works). However, the largest effect is expected to be associated with dredging operations, which is anticipated to involve capital

dredging within the harbour and disposal of material partially offshore at Beaufort's Dyke and partially within the proposed area of land reclamation within the harbour.

11.54 Sediment plume modelling was carried out by RPS to identify increases in SSCs within the water column as a result of anticipated spilled material during dredging activity, and subsequent sedimentation of the sea bed. This is fully detailed in **Chapter 7**, with potential changes to SSCs fully assessed therein and not explicitly considered here. The WFD does not directly prescribe EQS for SSCs; however, they do prescribe EQS for specific pollutants that might be associated with suspended solids. Consideration has, therefore, been made of the implications of changes in SSCs (as identified in **Chapter 7**) on key water quality indictors – including dissolved oxygen concentrations and contaminant levels in the water column, the latter of which can become elevated due to the release of sediment-bound chemical contaminants contained in suspended dredge material. Consideration has also been made of the implications of identified sedimentation of the sea bed on loch bed morphology, following the settlement of elevated SSCs.

11.55 Taking this into account, this section assesses the following potential effects on water quality and hydromorphology from activities during the construction phase:

- Accidental spillages or leaks;
- Changes to dissolved oxygen in the water column;
- Release of sediment-bound chemical contaminants into the water column; and
- Sedimentation impacts on loch bed morphology.

11.56 The potential implications of changes in water quality and hydromorphology on biodiversity and designated sites are considered separately in **Chapter 12**, **Chapter 13**, **Chapter 14** and **Chapter 15**.

Accidental spillages or leaks during construction

11.57 During the construction phase there is potential pollution risk from accidental spills or leaks of fuel, oil, concrete or other construction material, which could result in the contamination of the water and sediments. Should such pollution occur, the adverse effect on water quality and its associated ecology could be significant, with the scale dependent on the nature and magnitude of the pollution incident. Depending on the substance entering the water this could materially change baseline conditions, and so has the potential to have a High magnitude of impact in the absence of mitigation. As Loch Ryan Water Quality is considered to have High sensitivity, this results in a **Substantial** significance of effect.

Potential changes to dissolved oxygen in the water column

11.58 Elevated SSCs can increase chemical and biological oxygen demand in the water column, which has the potential to reduce dissolved oxygen concentrations. However, this effect is primarily associated with organic rich material. The organic content of offshore samples in

Loch Ryan marine deposits has been found to be low (**Paragraph 11.41**). Therefore, the potential effects of elevated SSCs on dissolved oxygen are likely to be minimal.

11.59 While increases in SSC are anticipated as a result of dredging, these are predominantly localised within the harbour and short-term, and are expected to return to background levels following cessation of proposed works. Additionally, the most recently available WFD classification reporting data (see **Table 11-8**) indicates a High status in relation to dissolved oxygen levels in Loch Ryan and it is considered unlikely that short-term increases in SSC would significantly reduce these levels.

11.60 Although Loch Ryan Water Quality is considered to have High sensitivity, based on the estimated short-term increases in dissolved concentrations due to dredging activities and low organic content of marine deposits, this is considered to have a Negligible magnitude of impact resulting in a **Negligible** significance of effect.

Potential release of sediment-bound chemical contaminants into the water column

11.61 Sampling detailed in the baseline section indicates that sediments within Stranraer Harbour contain elevated levels of various trace metals and PAHs, in exceedance of Marine Directorate AL1. One individual sample also recorded exceedances of Marine Directorate AL2 for Nickel. Dredging activity at the harbour has the potential to disturb, re-distribute and release these contaminated sediments into the water column.

11.62 Further assessment of the exceedances of AL1 and AL2 have been carried out as part of BPEO reporting to confirm the suitability of the sediment for offshore disposal and potential impacts to the receiving environment (**Appendix 11.1**). This concludes that average concentrations of all contaminants (i.e. when considering the material as a single volume for disposal) remain below AL2, with only Nickel and three PAH species exceeding AL1.

11.63 There is currently no guidance or procedure in place regarding the handling of sediments which fall between AL1 and AL2 or the lines of evidence that should be considered to evaluate these samples[32]. However, PAHs are hydrophobic with low aqueous solubility and will naturally remain associated with organic sediment fractions, rather than become dissolved within the water column. On this basis, the risks associated with impact to water quality from chemical contaminants in sediment are considered to be low, with the associated dilution potential providing further mitigation. The key contaminants for impacting water quality are considered to be metals as these have the potential to dissolve or desorb from sorption sites within the sediment. Consideration has, therefore, been made of potential local changes in in-water pollution concentrations of metals within the harbour which could result from disturbance of these sediments – based on predicted increases in SSCs, identified maximum

[32] Marine Management Organisation, 2015. High Level Review of Current UK Action Level Guidance MMO Project No: 1053

concentrations of contaminants, and known partition coefficients for each contaminant – as detailed in the following paragraphs.

11.64 A maximum SSC of 20,000mg/l has been identified as a result of proposed dredging activity for the realistic worst case scenario modelled (see **Chapter 7**). For the purposes of modelling it was assumed that the entirety of this suspended material would comprise sands and silts, as coarse material – such as gravel – will settle and be removed by further dredging; as will clay fractions, which are considered to be highly cohesive and likely to be deposited in 'clumps'. The grading of material utilised within the sediment plume modelling for dredging at different depths is detailed in **Table 11-10**.

Table 11-10: Sediment Grading in Ground Deposits and Sediment Plume

Sediment Type	Proportion (%)			
	Top 0 – 2m		2 – 5m depth	
	Ground Deposits	Sediment Plume	Ground Deposits	Sediment Plume
Coarse material/gravel	4	0	4	0
Med/coarse sand	13	15	18	20
Coarse silt/fine sand	32	37	48	54
Fine/med silt	23	27	14	16
Very fine/fine silt	18	21	9	10
Clay	10	0	7	0
*See **Chapter 7** for further details*				

11.65 Contaminants are predominantly associated with fine material (silt and clay). As the entirety of the suspended material is assumed to comprise only sands and silts, the percentage of suspended material likely to contain contaminants is expected to be equivalent to the maximum proportion of silt content within the modelled sediment plume. It is, therefore, assumed that 84.9% of the maximum modelled SSCs has the potential to contribute to in-water pollutant concentrations (see **Table 11-10**).

11.66 The sediment-bound contaminant concentrations within the sediment plume has been defined based on maximum identified concentrations of Nickel (161mg/kg), Chromium (106mg/kg), Copper (37.4mg/kg), Cadmium (0.5mg/kg) and Zinc (149mg/kg) identified within the sediment sampling carried out as part of the GI (fully detailed in **Appendix 21.1: Geo-Environmental and Geotechnical Interpretative Report**) and BPEO sampling (**Appendix 11.1**), with the dissolved fraction released into the water column determined based on published partition coefficients for each contaminant (see **Table 11-11**).

11.67 This dissolved concentration has been compared to respective EQS values to evaluate whether an adverse effect could arise due to proposed dredging activity. It should be recognised that the increase in SSCs will be short-lived and so short-term EQS values, referred to as the maximum allowable concentration (MAC), are used where available. Where this is not available the 95th percentile (95%ile) and/or annual average (AA) EQS is presented. Results indicate that the estimated maximum dissolved concentration falls below all identified EQS for all contaminants assessed, with the exception of Chromium which exceeds the annual

average EQS (see **Table 11-11**). However, this remains well below the 95%ile EQS which is more applicable given the expected short-lived nature of the sediment plume.

11.68 Although Loch Ryan Water Quality is considered to have High sensitivity, based on the estimated short-term/local increase in dissolved concentrations of nickel, chromium, copper, cadmium and zinc due to dredging activities, for which the respective relevant EQS values are not exceeded, this is considered to have a Negligible magnitude of impact. This results in a **Negligible** significance of effect.

FAIRHURST

Table 11-11: Maximum in-water (dissolved) pollutant concentrations as a result of dredging

Contamin-ant	Maximum Total Contaminant Concentration		Sediment Water Partition Coefficient (Ksed)	Maximum Potential Dissolved Contaminant Concentration		Maximum SSC		Maximum Suspended Contaminant Conc.	Maximum Dissolved Contaminant Conc.	EQS for Transitional and Coastal Waters ¶		
						Total	Silt Compon-ent			Annual Average	95%ile	MAC #
	mg/kg	*%*	*l/kg*	*mg/l*	*%*	*mg/l*	*mg/l*	*µg/l*	*µg/l*	*µg/l*		
Nickel	161	0.02	2,138*	7.53E-05	7.53E-06	20,000	16,977	2,733	1.28	8.6	-	34
Chromium	106	0.01	940†	1.13E-01	1.13E-05			1,800	1.91	0.6	32	-
Copper	37.4	3.74E-03	4,074‡	9.18E-03	9.18E-07			635	0.16	3.76	-	-
Cadmium	0.5	5.00E-05	130,000§	3.85E-06	3.85E-10			8	0.0001	0.2	-	0.45
Zinc	149	0.01	110,000‖	1.35E-03	1.35E-07			2,530	0.02	7.9	-	-

* Derived from SGRPSL. (2011). Nickel and its compounds. Nickel EQS dossier. Sub Group on Review of the Priority Substances List (under Working Group E of the Common Implementation Strategy for the Water Framework Directive

† Derived from European Commission. (2005). European Union Risk Assessment Report. Chromium trioxide, sodium chromate, ammonium dichromate, potassium dichromate. 3rd priority list. Volume 53. European Commission & Wang, X., Griscom, S. B., & Fisher, N. S. (1997). Bioavailability of Cr(III) and Cr (IV) to marine mussels from solute and particulate pathways. Environmental Science and Technology, 31: 603 611.

‡ Derived from European Copper Institute (ECI). (June 2008). Review of copper partitioning coefficients in the aquatic environment and processes causing the observed variation. European Union Risk Assessment Report: Voluntary risk assessment of copper, copper II sulphate pentahydrate, copper(i)oxide, copper(II)oxide, dicopper chloride trihydroxide

§ Derived from E.C. Environmental Quality Standards (EQS) [Cd]. Substance Data Sheet. Priority Substances N°.6. Cadmium and its Compounds. CAS-No. 7440-43-9. Final version. Brussels, 31 July 2005.

‖ Derived from European Commission. (2010). European Union Risk Assessment Report. Zinc Metal CAS: 7440-66-6 EINECS No: 231-175-3

¶ Environmental Quality Standards as described in Scotland River Basin District (Standards) Directions 2014 and Scotland River Basin District (Standards) Amendment Directions 2015) (Scottish Government, 2015). Shaded red where exceeded by predicted maximum dissolved contaminant concentration.

Maximum Allowable Concentration

Potential sedimentation impacts on loch bed morphology

11.69 Sediment plume modelling carried out by RPS identifies potential sedimentation of the sea bed in response to predicted increases in SSCs resulting from proposed dredging activity (as detailed in **Chapter 7** and illustrated on **Figure 11-1**).

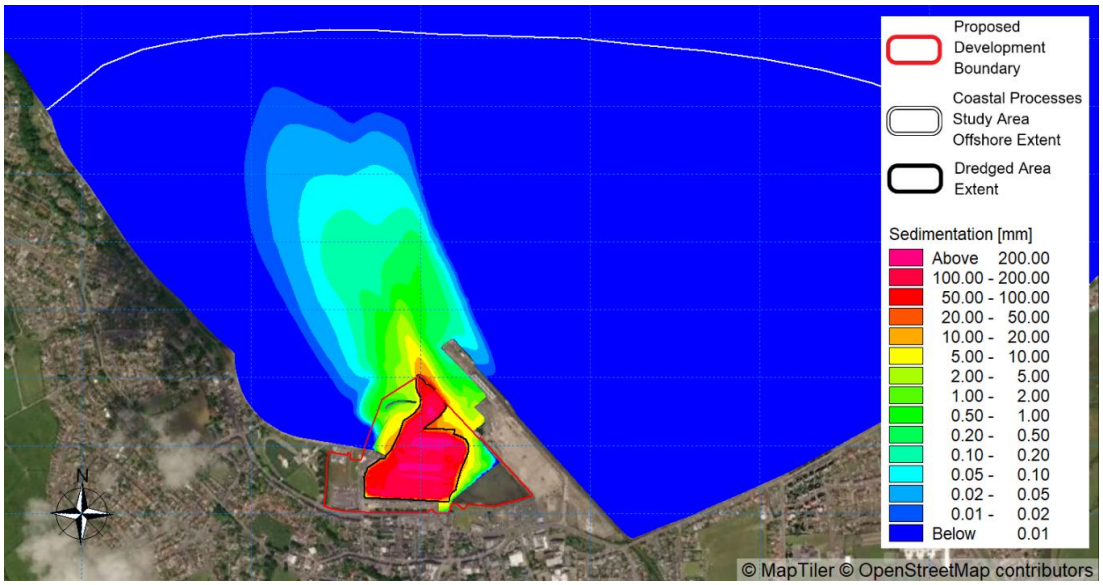

Figure 11-1: Predicted Overall Sedimentation due to Dreding Operations

11.70 Model results indicate that the greatest sedimentation will occur within the dredging area extent itself, with depths locally exceeding 200mm. However, this will be removed on subsequent dredger passes and so sediment accumulation here is not relevant. Maximum depths of up to 50mm are identified within the wider proposed development boundary and beyond this sedimentation is significantly lower, with depths below 5mm within 200m of the harbour mouth and below 0.5mm at a distance of 400m. Loch Ryan hydromorphology is considered to have High sensitivity; however, given the limited depths and extent of sedimentation identified beyond the dredging area extent, this is expected to have a Negligible magnitude of impact on existing loch bed morphology. This results in a **Negligible** significance of effect.

Operational Phase

11.71 Site operation will represent a permanent change to the baseline environment. At this phase, predicted effects of the proposed development are long-term and so have the potential to have a greater significance of effect on environmental receptors. Taking this into account, the following potential effects have been assessed for the operational phase:

- Pollution risk from increased onsite pollutant sources and associated effects on water quality;
- Permanent physical changes altering pollutant dispersal patterns and associated effects on water quality;

- Ongoing disturbance and mobilisation of physical contaminants as a result of periodic operational dredging and associated effects on water quality and hydromorphology; and
- Permanent physical modification of the loch and associated effects on hydromorphology.

11.72 The design of the proposed development has taken account of potential effects and it is expected that good practice will be employed and design standards adhered to in the detailed design to fully avoid or minimise potential adverse effects during the operational phase. As such, the proposed development incorporates embedded mitigation to protect the water environment (see **Paragraph 11.51**). This section summarises the potential residual effects of the proposed development on identified receptors from activities during the operational phase, incorporating this embedded mitigation.

Increased onsite pollutant sources

11.73 The proposed development will be used in a very similar way to the current marina; however, this will represent an increase in scale of the marina and does have the potential to introduce additional pollutant sources along the loch edge (e.g. new fuel berth, chemical storage for wash bays, floating toilet block and black water disposal points, increased vehicular traffic, etc.), as well as increasing boat traffic within the loch itself. Standard good practice and embedded mitigation detailed under **Paragraph 11.51** will limit potential pollutant pathways and largely mitigate associated risks to water quality within the loch. Additionally, new surface and foul water drainage systems, black water disposal points and toilet facilities have the potential to improve conditions in comparison to baseline through the provision of appropriate disposal services, and treatment of waste water. Therefore, on balance, associated impacts are considered of **Negligible** magnitude, resulting in a **Negligible** significance of effect.

Permanent physical change altering pollutant dispersal and water quality

11.74 Tidal currents and wave climate is predicted to remain substantially unchanged within the harbour following construction of the proposed development, as per the detailed assessment undertaken in **Chapter 7**. Given the localised nature of identified changes and the lack of identified point discharges within the harbour itself, it is unlikely that there will be any significant change in pollutant dispersal patterns or sediment transport which could impact water quality in the wider Loch Ryan. Associated impacts are, therefore, considered of **Negligible** magnitude, resulting in a **Negligible** significance of effect.

Operational dredging/maintenance

11.75 It is anticipated that maintenance dredging will be required to keep harbour access channels and berths at their designed depths, with associated dredge arisings expected to be disposed to Beaufort's Dyke. The effects associated with maintenance dredging are likely to be the

same as the capital (construction) works assessed above; however, the comparative scale of impact is expected to be much lower on each occasion, due to the limited depth of dredging expected to maintain design levels. Associated impacts are, therefore, considered of **Negligible** magnitude, resulting in a **Negligible** significance of effect.

Physical modification of loch bed morphology

11.76 Proposed physical alterations within Loch Ryan will permanently affect the hydromorphology of the waterbody, which has the potential to impact on WFD objectives. This can result either due to the direct physical impact of proposals, or secondary impacts on hydrodynamics. Within transitional water bodies hydrodynamics essentially refers to the tidal regime, wave climate and freshwater inflows; which all have the potential to impact on hydromorphology.

11.77 As part of marine licencing requirements, the Marine Directorate will utilise their internal TraC-MImAS (Transitional and Coastal Waters Morphological Impact Assessment) tool to fully quantify the potential impact of the proposed development on the hydromorphology of Loch Ryan[33]. This tool uses the concept of 'system capacity' and can be used to calculate how much capacity has been/will be consumed by human activities. The total capacity consumed can then be compared with Morphological Condition Limits (MCLs) to determine the level of impact of any new development proposals on the current WFD status of the water body.

11.78 Loch Ryan currently has High physical condition and hydromorphology WFD status due to the low level of anthropogenic modification on a water body scale. MCLs include a 5% capacity limit which must not be exceeded if High status is to be maintained. This limit is applied separately to alterations within the intertidal zone (i.e. above the low tide mark), within the subtidal zone (i.e. below the low tide mark), and to impacts on the hydrodynamics of the water body.

11.79 Proposed physical alterations within the intertidal and subtidal zones of Loch Ryan are summarised in **Table 11-12**. This will result in an overall footprint on the loch bed totalling around 0.08km^2; comprising 0.02km^2 in the intertidal zone and 0.06km^2 in the subtidal zone.

11.80 The TraC-MImAS tool is used first to assess local scale impacts (Stage 1), considering typically up to a maximum 0.5km^2 assessment unit; and subsequently water body scale impacts (Stage 2) if local scale impacts are found to exceed MCLs. Proposed physical alterations are concentrated within the existing harbour, which comprises an area of around only 0.1km^2 and contains a number of existing anthropogenic modifications. It is, therefore, expected that MCLs will be exceeded on a local scale (i.e. under TraC-MImAS Stage 1).

[33] UKTAG, 2012. TraC-MImAS Technical Report (Development and Review of a TraC Hydromorphology Decision Support Tool for (a) screening proposed new or altered activities / structures for compliance with WFD water body status and (b) classifying TraC waters under the WFD)

However, on a water body scale proposed alterations are equivalent to only 0.6% of the total intertidal zone and 0.2% of the total subtidal zone (see **Table 11-13**)[34].

Table 11-12: Breakdown of Proposed Alterations in Loch Ryan (m^2)

	Intertidal	Subtidal	Details
Dredging	2,500	58,000	
Land Reclaim	19,860	-	Impacts around 400m of existing shoreline, and will incorporate an approximately 200m long new perimeter sea wall/revetment.
Tidal Devices - Extension to Existing Breakwater	-	3,120	Approximately 40m additional length, and increase to approximately 40m in width.
Piled Structures	-	31	Approximately 54. Piles: 11No. at 1016mm diameter; 43No. at 813mm diameter
Shoreline Reinforcement	540	279	South Quay Wall – approximately 180m long x 3m wide subtidal, and 70m long x 3m wide intertidal. Sheet piled Knuckle Quay Wall - approximately 115 m long x 0.6 m wide subtidal.
Other Sea-bed Uses - Slipway Improvement Works	235		Approximately 40m long new slipway
TOTAL	**23,135**	**61,430**	

Table 11-13: Total Footprint of Proposed Alterations in Loch Ryan (km^2)

	Intertidal	Subtidal
Total Proposed Alterations	0.02	0.06
Total Harbour Area	*0.03*	*0.09*
Loch Ryan Water Body Area	*4*	*38*
% of Water Body	**0.6%**	**0.2%**
% MCL Capacity Used	**0.4%**	**0.4%**

11.81 Different pressures consume different amounts of hydromorphological capacity and the percentage footprint does not directly equate to the capacity used. The Marine Directorate have provided a copy of the TraC-MImAS tool which has allowed for an initial high level assessment of the actual hydromorphological capacity expected to be used by proposals. This indicates that proposed alterations will utilise 0% of the total hydrodynamic zone capacity, 0.4% of the total intertidal zone capacity and 0.4% of the total subtidal zone capacity on a water body scale. This falls well below the 5% MCLs.

11.82 It is recognised that some of the available 5% capacity will be utilised by existing development. Existing pressures are typically concentrated along the shoreline in the intertidal zone and predominantly comprise existing areas of reclaimed land, harbour infrastructure and shoreline reinforcement in Stranraer and the Cairnryan to Belfast and Cairnryan to Larne Ferry

[34] Proposals will also impact an approximately 0.75km length of the existing shoreline. However, the entirety of the impacted shore contains existing sea walls / revetments rather than natural shoreline and so this is not considered to represent a further deterioration of natural shoreline from baseline conditions and consideration has been made only of the associated footprint on the seabed.

Terminals to the north. Additional local slipways and other modifications will also be present around the coastline. However, within TraC-MImAS existing pressures use up comparatively less capacity than new development – with historic pressures categorised as low impact due to pre-existing adjustment of the water body over time, and new pressures categorised as high impact. Given the scale of Loch Ryan and length of untouched coastline, as well as the comparatively lower impact of existing infrastructure on morphological capacity, this water body is expected to have sufficient capacity to absorb both existing and proposed hydromorphological pressures on a water body scale.

11.83 Detailed assessment has also been undertaken in **Chapter 7** to predict potential impacts on the hydrodynamics of the water body as a result of proposed physical alterations and this predicts that the tidal regime, wave climate and sediment transport regime will remain substantially unchanged. Given the localised nature and small absolute magnitude of any predicted changes in tidal current velocity, it is unlikely that there will be any significant change in net scouring or deposition of sediments within the wider water body and so no associated impact is expected on hydromorphology.

11.84 Given the limited impact identified on hydrodynamics and the limited reduction in hydromorphological capacity associated with proposed physical alterations on a water body scale, associated impacts are considered of **Low** magnitude. As Loch Ryan hydromorphology is considered a **High** sensitivity receptor, this results in a **Slight/Moderate** significance of effect. Effects considered as being Slight/Moderate or below are not considered to be significant for the purpose of this EIA.

Mitigation, Monitoring and Residual Effects

Mitigation/ Monitoring

Construction Phase

11.85 The contractor will be required to produce and agree a Construction Environmental Management Plan (CEMP) to describe how construction will be managed to avoid, minimise and mitigate any potential construction effects on the environment and existing surrounding receptors. This must include details on appropriate measures to manage and mitigate risk to Loch Ryan, including but not limited to:

- Construction site runoff and sedimentation;
- Oil /fuel leaks and spillages;
- Chemical storage, handling and reuse; and
- Concrete, cement and grout handling and use.

11.86 Construction works and operation of machinery must be undertaken in accordance with standard good practice measures, including good pre-construction planning, site practices and adherence to relevant guidance for pollution prevention (detailed in **Table 11-1**). This will include, but is not limited to, adherence to the following:

- C532: Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors;
- GPP 5: Works and maintenance in or near water;
- GPP 6: Working at construction and demolition sites; and
- GPP 21: Pollution incident response planning

11.87 As the impact from accidental spills or leaks of oils and/or chemicals has the potential to be substantial, appropriate procedures are critical to manage this risk and must consider the following:

- Water Environment (Controlled Activities) (Scotland) Regulations 2011 General Binding Rule (GBR) 28 and GPP 2 on Above Ground Oil Storage should be implemented to ensure safe storage of fuel, oils and chemicals. Storage should be sited on an impervious base within a bund and secured. The base and bund walls should be impermeable to the material stored and of adequate capacity. Storage facilities should also incorporate flood resilience measures in consideration of potential extreme sea water levels and/or waves during the construction period.
- Appropriate safety precautions must be followed during refuelling activities to minimise the risk of an oil spill.
- An Oil Spill Contingency Plan should be provided, which details actions required to stop or minimise a spill and to mitigate its effects. In line with this, emergency spill

kits and oil spill containment equipment should be located at strategic locations adjacent to the works.

11.88 Dredging works and disposal of dredge arising must be consistent with the following:

- Utilise the most suitable dredging equipment in order to minimise the suspension of any fine sediments and contaminants at the dredge site;
- Undertake in a manner that limits, as far as practically possible, the disturbance and dispersion of sediments from the dredger and barges, during dredging operations and transport;
- Incorporate appropriate distribution of dredge materials at the disposal site; and
- Appropriate timing of operation to avoid or minimise disturbance to marine habitats.

11.89 During the construction period, the Principal Contractor must employ an Environmental Clerk of Works (ECoW), to help ensure that mitigation measures identified through the EIA process, alongside marine and planning conditions, are appropriately implemented and monitored during construction.

Operational Phase

11.90 Embedded mitigation realises the benefits of measures to mitigate potential effects through the initial scheme design and removes the need for additional measures to be implemented for the operational phase.

Residual Effects

Construction Phase

11.91 By undertaking appropriate mitigation detailed in Paragraphs 11.85 - 11.89, it is anticipated that the potential for accidental spillages or leaks will be reduced/suitable contingency plans will be in place to reduce the associated magnitude of impact to Low, such that the effect of the proposed development for the construction phase has been assessed as **Slight/Moderate** for water quality (due to potential Low magnitude impacts on High sensitivity receptors) and as **Negligible** for hydromorphology.

Operational Phase

11.92 The residual effect of the proposed development for the operational phase remains **Negligible** for water quality and **Slight/Moderate** for hydromorphology (due to Low magnitude impacts on High sensitivity receptors as a result of a measurable reduction in the hydromorphological capacity of Loch Ryan).

Cumulative Effects

11.93 Existing and proposed developments within the vicinity of the proposed development are discussed in **Chapter 25** and summarised below.

11.94 The following committed projects have been identified:

- **Planning Permission**
  - 25/0778/FUL: Grass Verge Next To Harbour Office West Pier Market Street Stranraer DG9 7RE - Installation of one 10 metre high streetworks column, 3 antennas,1 network camera, 1 equipment cabinet and associated works
  - 24/1407/FUL: Former Stena Port Port Rodie Stranraer - change of use of part of former port to form haulage yard (class 6), siting of office, erection of 3 metre high security fencing and access gate and installation of security lighting columns (partially retrospective)
  - 24/1534/FUL: Land To The West Of Loch Ryan And North Of Corsewall Burn At Corsewall Estate Kirkcolm Stranraer DG9 0NX - Formation of coastal habitat for seabirds including formation of inland pool with islands, water inlets and outlets from and into Loch Ryan, screening bunds up to 2 metre high, 3 bird hides, access routes, upgrading bridge crossing of Corsewall Burn, landscaping and associated works including relocation of excavated earth to southern field
  - 23/0739/CLP: Land At Port Rodie Car Park Harbour Street Stranraer DG9 8EG - Installation of 4 electric vehicle charging points with associated charging upstands, supporting equipment cabinets and substation infrastructure
  - 23/0976/FUL: Land Between West Pier And Agnew Park, Stranraer Harbour, Stranraer - Erection of boat shelter with roof mounted solar panels; extension to boat yard including formation of hardstanding area, installation of pole mounted flood lights, erection of 2 metre high security fencing and formation of gated access; formation of instructor platform, equipment lay down area, open air showers, stepped access to the beach and erection of instructor shelter
  - 23/0970/FUL: Land To West Of Marina And Harbourmaster's Office Stranraer - Erection of watersports centre and installation of roof mounted solar photovoltaic panels, formation of additional parking area with associated hard and soft landscaping and formation of footpath
  - 22/0394/S36: Mid Moile Windfarm Cairnryan - Consent under section 36 of the electricity act 1989 and deemed planning permission under section 57(2) of the Town and Country Planning (Scotland) Act 1997 for construction and

operation of a windfarm within the planning authority area of Dumfries and Galloway Council

- **Marine Licences**
  - 00009930 (Marine Scotland): Capital[35] Dredging and Sea Disposal - Loch Ryan Port, Cairnryan – Consented: 15/12/2022; Expires:14/12/2025.

11.95 The following projects awaiting determination have also been identified:

- **Planning Applications - Awaiting Determination**
  - 25/1190/FUL: Port Rodie Car Park Port Rodie Stranraer DG9 8EG - Erection of transport hub with roof mounted photovoltaic panels incorporating provision of secure bicycle locker storage for bicycles, e-bikes (electric bicycles) and acc-bikes (accessible electric bicycles), bike wash/pump/repair station, public toilets, bus waiting area(s), internal general purpose space and external shelter with fixed benching and installation of 5no. bike stands and 4no. electric vehicle charging units
  - 24/2518/FUL: Site Adjacent To Springbank Road Stranraer DG9 0HS - Erection of 77 dwellinghouses with roof mounted solar panels and air source heat pumps, formation of access and internal road and footpath layout, 178 car parking spaces, landscaping, SuDS drainage pond and associated infrastructure
- **Marine Licence Applications - Awaiting Determination**
  - 00010825 (Marine Scotland): Construction of: Platform for instructor shelter. Removal of: 2 no. redundant sewer outfall pipes & debris, unlit beacon, removal of boulders, beach clearance
  - 00010841 (Marine Scotland): Marine Construction & Pontoon Deposit - 8 (pontoons) + 3 (racing markers). Moorings are for offshore pontoons as opposed to vessels. Small craft (e.g. SUP, dinghies) will dock against the pontoons temporarily as rest stations. No vessels will be moored to the racing markers.
  - 00010772 (Marine Scotland): Marine Licence Application – 18 Moorings

Construction Phase

11.96 It is possible that the projects identified above could have additional short term effects on water quality and/or hydromorphology in Loch Ryan during their respective construction phases. Particularly any dredging associated with Loch Ryan Port at Cairnryan (Marine Licence 00009930). However, these projects will be subject to strict environmental controls by regulators and will be required to implement extensive mitigation, comparable to that outlined in **Paragraphs 11.85 to 11.89**, to negate or minimise impacts. The construction phases of

[35] Licence application details indicate that this is required for the purposes of ensuring the port meets the original capital dredge design depth as completed in 2011 if required.

these projects will also not necessarily be concurrent with the proposed development. Additionally the Loch Ryan Port is located over 8km north of Stranraer harbour and is unlikely to lead to an in-combination effect with the proposed development. As a result, it is anticipated that the effect on water quality and hydromorphology will remain **Slight/Moderate** for water quality and **Negligible** for hydromorphology for the construction phase when considering the cumulative effect of these projects.

Operational Phase

11.97 All terrestrial developments constructed since the enactment of the Water Environment and Water Services Act in 2003 are expected to incorporate suitable drainage systems, with pollution treatment measures where required in line with SEPA's Supporting Guidance WAT-SG-12[31]. It is, therefore, expected that proposed developments identified within the vicinity of the proposed development will incorporate drainage strategies which mimic natural catchment hydrology, providing appropriate treatment where required to prevent adverse effects on water quality from any associated increase in pollutant sources.

11.98 Permitted dredging at Loch Ryan Port is for the purpose of ensuring the port meets the original capital dredge design depth as completed in 2011, and so is not considered to represent any further hydromorphological change to the water body. Other potential marine developments (awaiting determination) are limited to local moorings, markers and instructor platforms associated with the consented Boathouse (23/0976/FUL) and Watersports Centre (23/0970/FUL) to the west of the Marina. Given the minimal footprint of these proposals within the 42km^2 Loch Ryan, this is expected to have sufficient capacity to absorb these additional hydromorphological pressures on a water body scale and associated impacts are considered to remain of **Low** magnitude.

11.99 As a result, it is anticipated that the effect on water quality and hydromorphology will remain as **Negligible** for water quality and **Slight/Moderate** for hydromorphology for the operational phase when considering the cumulative effect of these developments.

Summary and Conclusions

11.100 This chapter assesses potential effects of the proposed development on Loch Ryan; in terms of water quality and hydromorphology. The assessment of effects is summarised in **Table 11-14** and **Table 11-15**.

11.101 Although potential effects on water quality during the construction phase are likely, these are expected to be temporary in nature and can be avoided or minimised through the application of appropriate additional mitigation measures. The residual (post-mitigation) level of construction effects has, therefore, been assessed as **Slight/Moderate** for water quality and **Negligible** for hydromorphology.

11.102 The inherent nature of the proposed development requires engineering activities within the marine environment and so operational phase impacts on hydromorphology are unavoidable. However, with consideration of mitigation embedded within the design – including appropriate siting and design, informed by coastal modelling – the level of potential operational effects has been assessed as **Negligible** for water quality and **Slight/Moderate** for hydromorphology.

11.103 Overall, **no significant effects** have been identified on the water quality or hydromorphology of Loch Ryan.

FAIRHURST

Table 11-14: Summary of Potential Construction Phase Effects

Potential Effect	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of Effect	Additional Mitigation	Residual Magnitude of Impact	Residual Significance of Effect
Accidental spillages or leaks during construction	Loch Ryan - Water Quality	High	High	Substantial	See Framework CEMP/ Paragraphs 11.85 - 11.89 in regards appropriate measures to manage and mitigate risk associated with: - Construction site runoff and sedimentation; - Oil /fuel leaks and spillages; - Chemical storage, handling and reuse; and - Concrete, cement and grout handling and use	Low	Slight/ Moderate
Potential changes to dissolved oxygen in the water column			Negligible	Negligible		Negligible	Negligible
Potential release of sediment-bound chemical contaminants into the water column			Negligible	Negligible		Negligible	Negligible
Potential sedimentation impacts on loch bed morphology	Loch Ryan - Hydromorphology	High	Negligible	Negligible		Negligible	Negligible

FAIRHURST

Table 11-15: Summary of Potential Operational Phase Effects

Potential Effect	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of Effect	Additional Mitigation	Residual Magnitude of Impact	Residual Significance of Effect
Increased onsite pollutant sources	Loch Ryan - Water Quality	High	Negligible	Negligible	With consideration of embedded mitigation, potential significant operational effects on water quality and hydromorphology will be prevented and no additional mitigation is required.	Negligible	Negligible
Permanent physical change altering pollutant dispersal and water quality			Negligible	Negligible		Negligible	Negligible
Operational dredging / maintenance			Negligible	Negligible		Negligible	Negligible
	Loch Ryan - Hydromorphology	High	Negligible	Negligible		Negligible	Negligible
Physical modification of loch bed morphology			Low	Slight/ Moderate		Low	Slight/ Moderate