REDEVELOPMENT OF ST.OLA PIER

EIA REPORT

NON TECHNICAL SUMMARY

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1 INTRODUCTION

1.1 Scrabster Harbour (Figure 1.1) is located in Scrabster on the north coast of Caithness. Scrabster is situated 1.5 miles northwest of Thurso, the largest town in Caithness, provides a ferry link to Orkney and is ideally located for access to the North Sea and Atlantic Ocean.

Figure 1.1: Scrabster Harbour

1.2 The existing St. Ola Pier was constructed in 1972 and has fallen into declining use due to ongoing corrosion of steel piling and lack of load bearing capacity for imposed deck loads. The existing Pier is situated within the centre of the harbour and incorporates a 100 metre long berth to the south-west, a linkspan and a further 115 metre berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003.

1.3 The outer side of the pier currently has no berthing because of a 1.5 metre high sea protection wall. The proposed redevelopment of St. Ola Pier aims to ensure the ongoing structural integrity of the pier. It also seeks to provide an enhanced straight berthing face on the inner side of the pier for use by oil and gas supply vessels, and for new additional berthing on the outer side of the pier for cruise ships of up to 250 metres long.

1.4 An Environmental Impact Assessment (EIA) Screening Opinion on the proposed redevelopment issued from Marine Scotland Licensing Operations Team (MSLOT) in March 2018, determining the proposed redevelopment to be EIA development under The Marine Works (Environmental

Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) transposing EC Directive 2011/92/EU as amended by Directive 2014/52/EU.

1.5 Upon submission of an EIA Scoping Report in July 2018 by Scrabster Harbour Trust (SHT) accompanying a request for a Scoping Opinion, a subsequent EIA Scoping Opinion was received from MSLOT in September 2018. That scoping opinion was adopted by the Scottish Ministers, under regulation 14 of the EIA Regulations and forms the basis of the EIA Report (EIAR). Certain environmental topics were scoped out as part of this formal scoping process:

- Coastal processes
- Waste management
- Flood risk
- Cultural heritage
- Landscape and visual
- Population, human health and socioeconomic effects
- Major accidents and disasters
- Material assets
- Cumulative effects

1.6 An EIAR is a detailed report of the findings of the Environmental Impact Assessment process. In particular, it predicts the environmental effects that the proposed redevelopment would have, and details the measures proposed to reduce or eliminate those effects. It informs the final decision on whether the proposed redevelopment should be allowed to proceed. Its function is to give stakeholders including the public and statutory environmental bodies, an opportunity to express an opinion before the scheme is initiated. It identifies, describes and assesses the significant environmental effects of the proposed redevelopment.

1.7 The EIAR highlights the anticipated significant environmental issues identified for both the construction and operational phases of the proposed redevelopment. It comprises a description of the proposed redevelopment of St. Ola Pier; the reasonable alternatives studied by the applicant; and relevant aspects of the environment and likely significant effects of the proposed redevelopment on the environment, as required by the EIA Regulations and in particular Schedule 4 thereto.

1.8 The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013, prescribe the marine licensable activities that are subject to pre-application consultation and, in combination with the Marine (Scotland) Act 2010, set out the nature of the pre-application process. The legislation came into force on 1st January 2014 and applies to all relevant marine licence applications submitted to Marine Scotland's Licensing Operations Team (MSLOT) on or after 6 April 2014.

1.9 The proposed redevelopment exceeds the trigger for public consultation as outlined within the Regulations and a formal pre-application consultation was undertaken in advance of the submission of a marine licence application.

1.10 A pre-application programme was undertaken in line with the aforementioned requirements including pre-notification to statutory consultees, public notice of and undertaking of a pre-application consultation event in Scrabster Harbour Trust offices. A Pre-Application Consultation

(PAC) Report was prepared and has been submitted along with the marine licence application and accompanying EIAR.

1.11 Informed by the Scoping Opinion, the objective of the EIAR is to present the environmental information that has emerged from the EIA scoping process in a concise, comprehensive and objective manner so that it can be effectively communicated to competent authorities, interested parties and the public. The EIAR for the proposed redevelopment has been prepared following consultation with statutory bodies, non-statutory bodies and stakeholders, desk studies and site surveys, as well as a collation of baseline data on the existing environment and an environmental assessment of the impact of the proposed redevelopment.

1.12 Information contained in the EIAR is presented in the following way:

- Non-Technical Summary (NTS)
- Volume I Main Report (See Table 1.2)
- Volume II Technical Appendices
- Volume III Design Drawings and Figures not included in Volume I

Table 1.1: Structure of Volume I of the EIAR

Chapter	Topic
1	Introduction
2	Project Description
3	Alternatives
4	Waste
5	Traffic and Transportation
6	Air Quality and Climate
7	Noise and Vibration
8	Geology, Hydrogeology and Contamination
9	Coastal Processes
10	Water Quality
11	Marine Biodiversity
12	Terrestrial Biodiversity and Ornithology
13	Interactions

1.13 This structure facilitates incorporation into the EIAR those environmental topics both highlighted by and scoped in by the Scottish Ministers' Scoping Opinion, and as specified in the EIA Regulations and allows those topics to be comprehensively assessed.

1.14 All experts employed by SHT to prepare the individual assessments have the appropriate qualifications and level of experience with their given field to undertake the relevant surveys and assessments.

1.15 A summary of the competency of experts that have been involved in the preparation of the EIAR is described in the EIAR.

1.16 The EIAR has been completed using the quality controls and procedures within the RPS Quality Management System to British Standard ISO 9001 and has ensured that all surveyors, assessors, co-ordinators and reviewers associated with the preparation of this EIAR have the appropriate qualifications and experience.

1.17 The EIAR has been subject to rigorous internal RPS peer review to ensure compliance with EIA Regulations.

2 PROJECT DESCRIPTION

2.1 The project is illustrated in the following design drawings which accompany the marine licence application:

- IBM0727-RPS-00-XX-DR-C-0150 Location of Works
- M0727-RPS-00-ID-DR-C-2000 Illustrative General Arrangement
- M0727-RPS-00-ID-DR-C-2001 Illustrative Sections
- M0727-RPS-00-ID-DR-C-2002 Illustrative Quay Furniture
- M0727-RPS-00-XX-DR-C-0100 Marine Licence Harbour Limits
- M0727-RPS-00-XX-DR-C-0151 Location of Dredging Works
- M0727-RPS-00-XX-DR-C-0152 Transportation Plan

2.2 The proposed project is a redevelopment of the existing St. Ola Pier (see Figure 2.2) which has fallen into declining use due to ongoing corrosion of steel piling and lack of load bearing capacity for imposed deck loads.

2.3 The opportunity afforded by redevelopment is being used to provide an enhanced straight berthing face on the inner side for service and cargo vessels with a new berth on the outside face; particularly for cruise vessels of up to 250m long.

2.4 The pier will be widened locally to accommodate straight berthing faces with resulting parallel berthing faces at approximately 32m apart.

2.5 Partial demolition of the existing pier will be required to allow for the construction of the new pier walls and decking. Pier quay walls will likely comprise steel tubular piles with interlocking steel sheet piles. It is proposed that any concrete broken out as part of the demolition works will be

crushed to allow for reuse within the works, as engineering fill (subject to meeting performance criteria).

2.6 The renovated pier will be circa. 280m long and fully enclosed around the perimeter. An enclosed structure will allow for beneficial reuse of both dredge spoil and crushed recycled concrete if suitable. There will be a concrete deck with drainage captured through full retention interceptors as well as a number of centrally positioned lighting masts capable of providing 50 lux.

2.7 The outer face will be dredged to provide a depth of -9m CD to accommodate cruise vessels and the inner face will be dredged to provide a consistent berth depth of -7.5m CD.

2.8 The works may also include for reclamation and revetment of 0.84ha (plan area of both) at the root of the pier. The reclamation area will provide storage space for cargo handling, and may house a number of fuel tank(s) in the future which will allow for the refuelling of vessels on St. Ola Pier. The reclaimed area would reuse the rock armour from the existing revetment on the newly reclaimed seaward face with a small additional requirement for extra rock armouring.

2.9 The volume of dredge material generated by the works is approximately 172,000m^3 of sandy gravel and clay. It is proposed that dredge material will be re-used within the reclaimed area and within the redeveloped pier structure (if deemed suitable by the works contractor). Alternatively dredge spoil may be disposed at a sea disposal site indicated in Best Practicable Environmental Option (BPEO) Report, Appendix 2.1, Volume II of the EIAR; or disposed at a licenced waste facility on land and off-site; or a combination of these solutions (subject to Contractor's chosen methodology). For the purposes of environmental assessment of the marine environment, it is assumed that the total volume of dredged material generated by these works (172,000m^3) shall be disposed at sea in the Scrabster dump site. For the purposes of traffic assessment, an additional scenario has been assumed whereby all of the dredged material is transported off site by road during the construction period.

2.10 Notwithstanding the above assumptions for the purposes of environmental assessment, the Design & Build tender will include a requirement that the detailed design will accommodate as much reuse of dredged material into the reclamation areas and into the body of the pier as is economically feasible.

2.11 A water and fuel supply will be provided on the St. Ola Pier. The fuel pipe will either be routed from the existing supply on the Jubilee Pier, or from a new tank(s) proposed for the reclamation area.

2.12 If the fuel supply is routed from Jubilee Pier, both water and fuel lines will be routed in a trench either along the seabed within the inner berth directly on to the St. Ola Pier, or on to the seabed to the root of the opposite Ice Pier and behind the existing ferry terminal building on to St. Ola Pier on land.

2.13 If the fuel supply is proposed from the new tank(s), the fuel line will be routed across land onto St. Ola Pier. In the case that the fuel supply is coming from the new tank(s), the water supply will be taken from an existing supply on the Queen Elizabeth Pier. The water line will also be routed across land onto St. Ola Pier. For EIA purposes both of the fuel supply route options outlined have been assess in the appropriate EIAR chapters.

2.14 In the case that the new fuel tank(s) option was pursued, the scope of SHT's works will be restricted to ensuring the reclamation area can accommodate the tank(s), and installing the necessary pipework and associated infrastructure to allow the import/export of fuel on the redeveloped quay. The actual tank(s) would be erected and operated by a third party at a later date. The tank(s) would be for the storage and supply of marine gas oil only. The fuel tank(s) will be 15m in diameter, 15m high with associated pipework. The tank(s) will be suitably bunded. The tank(s) will service vessels operating on the redeveloped St Ola Pier. A full retention oil separator will be installed to mitigate for potential impacts of fuel/ oil spillage or leakage and this will be maintained in accordance with the manufacturer's instructions by experienced personnel. Any potential spillages will be deal with in accordance with the Scarbster Harbour Trust Oil Spill Contingency Plan which is inluded in Appendix 2.3, Volume II of the EIAR.

2.15 All services will be buried within the pier and located within a covered trench which will allow for maintenance and access.

2.16 3 nr export (bunkering) points are proposed on each berth, with 1 nr fuel import point on each berth.

2.17 The works will require service connections to allow for power and water to service the redeveloped key. A minimum 400V shore power supply will be provided from the existing transformer located behind St. Ola Pier on the shoreside. A number of high mast lights will be provided to ensure adequate working light for all activities.

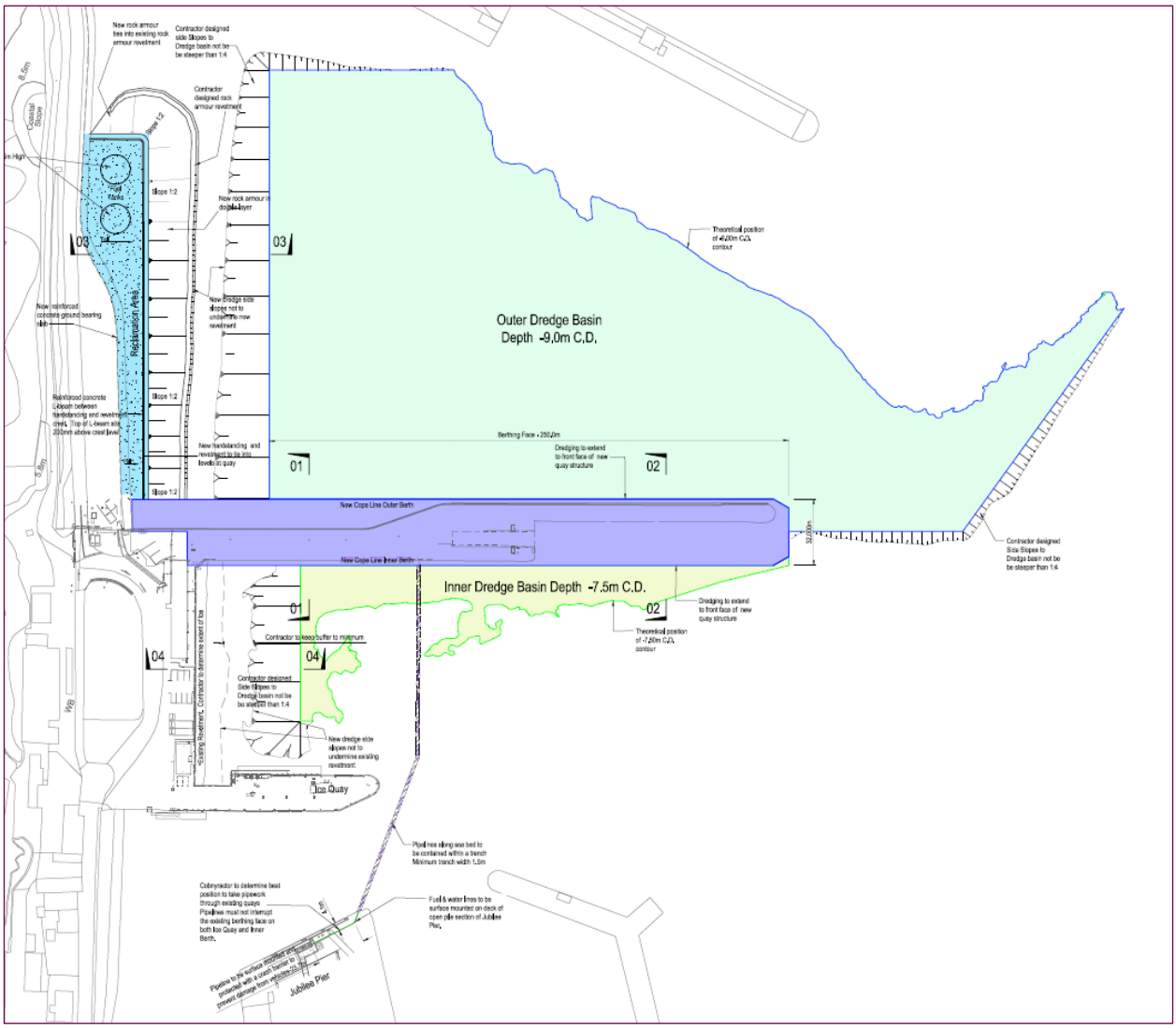

Figure 2.3: General Arrangement of Proposed Works

2.1 Elements of the Works

2.1.1 Demolition and Site Clearance

2.18 An element of demolition will be required to allow for the construction of new elements of the works. As it is proposed that the existing structure will be encapsulated within the new pier extents, the existing piling will be retained. However, the existing concrete decking and capping beams will be removed/broken out to accommodate the proposed works.

2.19 The existing concrete deck and concrete capping beam will be broken out to allow for installation of the new tie rod system and will allow for infilling of the new structure and construction of new concrete decking and capping beams.

2.20 As the existing structure varies in construction, the extent of demolition required will vary along the length of the existing pier.

2.21 Additionally, the existing pier layout varies in width and extents and as such the volume of infilling required will vary along the length of structure. The plan extents of the new structure outside of the existing pier can be seen in Figure 2.3.

2.22 A typical section through the existing outer berthing jetty has been included in Figure 2.4 showing the extents of the new structure encompassing the existing construction.

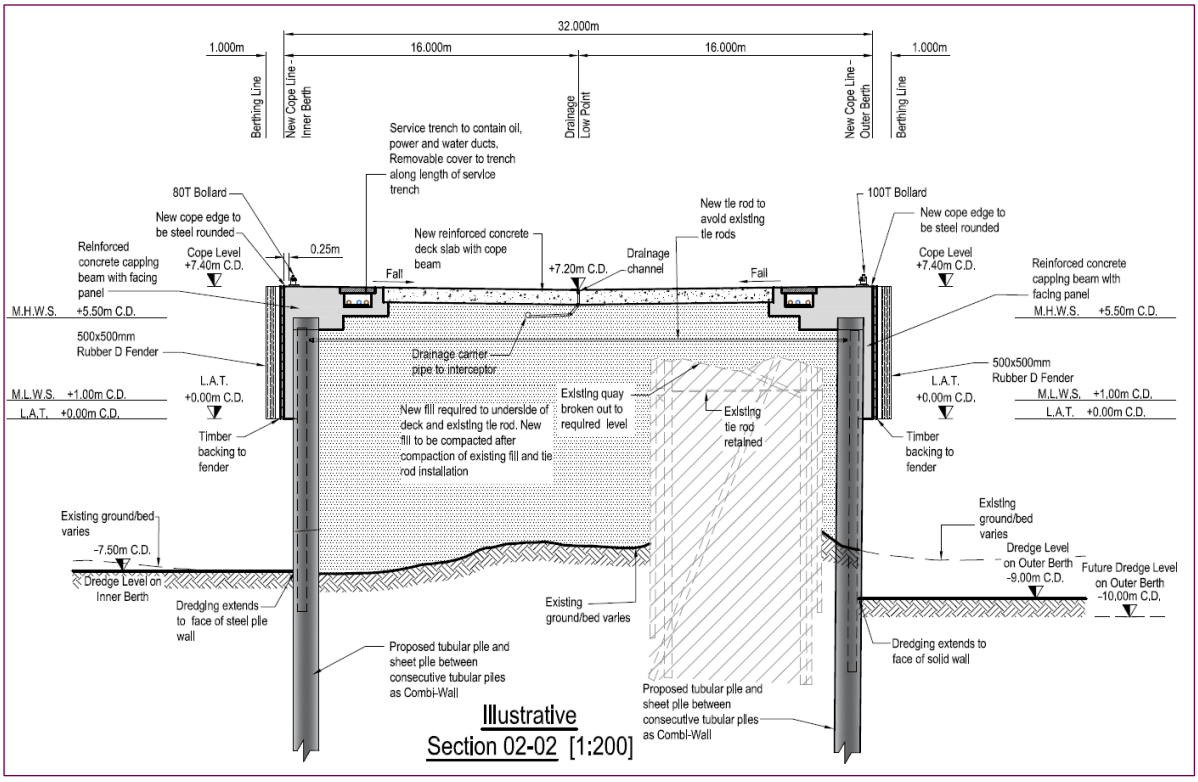

Figure 2.4: Typical Section Through Outer Structure Showing Existing Structure Encased by New Structure

2.23 Where appropriate, the material generated from the breaking out of the existing deck and capping beam will be screened and re-used onsite, within the pier structure, proposed reclamation or revetment.

2.24 All other material will be disposed offsite in accordance with all relevant statutory requirements and regulations. Demolition of the concrete structures will be carried out by means of excavator mounted rock breaker, concrete sawing, or a combination of these methods.

2.1.2 Pier Walls

2.25 A closed wall pier structure has been specified for the reconstructed pier. It is likely that this will comprise steel combi-wall piling (tubular steel piles with intermittent interlocking steel piles). If steel piles are proposed it is likely they will be impact driven, and given the anticipated conditions on site (presence of significant layers of boulder clay) some pre-augering may be completed to aid in pile installation.

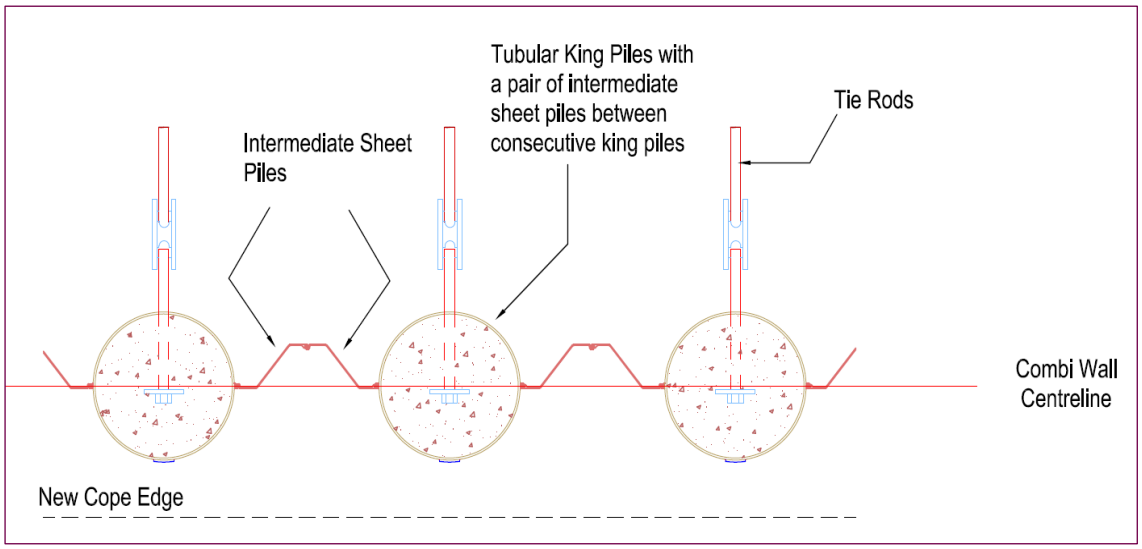

Figure 2.5: Typical Combi-Wall Arrangement

2.26 However, it is possible that the Contractor may choose to construct the redeveloped pier using some form of concrete pile solution. The new quay facing will encase the existing structure as shown on Figure 2.5.

2.27 It is anticipated that a degree of the piling works will be completed from the existing pier, with the structure being used as temporary platform for the works. Where it is not possible to work from the existing pier, it is likely that the contractor will employ a jack-up barge to complete marine piling. A typical jack-up barge completing pile installation can be seen in Figure 2.6. The ferry will continue to operate throughout the construction period and all marine piling and jack-up barge movements will be cognisant of this.

2.28 The jack-up barge will likely be tug assisted.

Figure 2.6: Typical Jack-Up Barge Completing Marine Piling

2.29 The pier walls will be required to incorporate a concrete capping beam to spread horizontal loading along the length of each berthing face. It is likely that a tie rod solution will be employed by the Contractor to provide lateral restraint to the new structure. The existing tie rods will likely be left in place to maintain the stability of the existing structure during construction, particularly as the existing structure will likely be used as temporary works. Any new tie rods will likely be placed above the position of the existing ties.

2.1.3 Concrete Pier Decking

2.30 A reinforced concrete deck will be provided to support the general deck loading and heavy lift area.

2.31 Compaction of the existing fill within the structure will be required prior to placement of any new fill and of the concrete decking to avoid excessive settlement and cracking. Compaction of the fill will likely be completed by means of a compaction roller.

2.1.4 Dredging

2.32 The outer face will be dredged to a depth of -9m CD to accommodate cruise vessels and the inner side will be dredged to provide a consistent berth depth of -7.5m CD. Dredge spoil will be reused within the reclamation or within the new pier structure if suitable. Material which is not suitable for reuse within the works will be disposed of at the sea disposal site outlined in Appendix 2.1, Volume II of the EIAR, or disposed at a licenced waste facility on land and off-site; or a combination of these solutions.

2.33 In line with Marine Scotland Licencing Operations, dredged material must be analysed in order to assess suitability for disposal at sea. A detailed description of the sediment analysis of the dredge

material has been provided in Chapter 10 Water Quality (Section 10.21), Volume II. Marine Scotland require submission of a BEPO report which assesses and identifies the most suitable method of disposal. The BEPO report has been prepared and is included in Appendix 2.1, Volume II of the EIAR.

2.34 The dredging will likely be completed by a backhoe dredger (Figure 2.7) given that a degree of the spoil is proposed to be repurposed within the works. If the material is not suitable for reuse in the works it is possible that the dredging will be completed by Trailing Suction Hopper Dredger (Figure 2.8). For the purpose of the EIAR, to be conservative, it has been assumed that the dredging will be undertaken over the shortest time possible using a 4000m^3 Trailer Suction Hopper Dredger (see EIAR Chapter 9 Coastal Processes, Volume II, for more details).

2.35 Split hopper barges will likely be used for the disposal of dredge material at the dumpsite, if this is the method of disposal proposed by the contractor.

Figure 2.7: Typical Backhoe Dredger

Figure 2.8: Typical Trailing Suction Hopper Dredger

2.1.5 Reclamation

2.36 A reclamation laydown area will be constructed at the base of the St. Ola Pier, which will be protected by a rock armour revetment. The area of new pavement formed on the reclamation area will be circa 4,000 m^2. The fill material used in the reclamation and revetment will consist of reused site won fill/dredge fill (if suitable) or imported fill, or a combination of both. Material is to be placed and compacted within the reclamation area, and a reinforced concrete pavement constructed up to finished level.

2.1.6 Revetment

2.37 A rock armour revetment is to be placed to the front of the reclamation area. The existing rock armour facing of the current revetment will be removed prior to reclamation construction and stored for reuse in the new revetment if suitable. The remainder of the rock armour required for the new revetment will be imported inert stone. It is possible that a geotextile membrane will be laid between the fill and rock armour material as part of the revetment construction.

2.38 It is anticipated that rock armour to the front of the revetment will be placed by land side machinery. The revetment will be constructed to the shore side of the reclamation area, with an anticipated slope of approx. 1:1.5.

2.39 Due to the anticipated size of the main armour, the material will likely be procured from overseas and transported to site by barge. It is anticipated that the rock armour will be landed on one of the existing piers, St. Ola, Jubilee or Ice Pier and then stored within the Contractors compound for use. Smaller underlayer armour or infill may be sourced locally and would likely be brought to site by road.

2.40 Foundations for barriers or fencing will be precast, lifted into position and placed behind the rock armour and backfilled.

2.1.7 Reclamation Surfacing

2.41 The reclaimed area will be surfaced using a heavy duty concrete pavement and tie in with the existing ground level on the ferry roadway. Transition slabs may be required at the interface of the reclaimed area and the existing road.

2.1.8 Storm Water Drainage

2.42 Storm water runoff on the pier will be collected by a central drainage channel, and likely a number of gullies on the seaward end discharging into the harbour waters through 2 nr. full retention separators.

2.43 Storm water runoff from the reclamation area will be collected by a drainage channel located toward the seaward face, this run off will be discharged into the harbour waters via a full retention separators.

2.44 Any existing outfalls located within the current revetment will be extended through the reclamation and new revetment to maintain functionality during construction, and after completion of the new reclamation and revetment.

2.1.9 M & E Services

Pier

2.45 Water supply will provided to the St. Ola Pier from the existing supply on Jubilee Pier or from the supply on Queen Elizabeth Pier. If routed from Jubilee Pier the supply will be either taken along the seabed on to the opposite Ice Quay and behind the existing ferry terminal building onto St. Ola Pier, or routed directly along the seabed from the Jubilee Pier on to the St. Ola Pier. If the water supply is coming from the QE Pier, the supply will be routed along land onto St. Ola Pier.

2.46 Quayside lighting shall be provided to the whole of the new pier area. Lighting of 50 lux (average) shall be provided on pier deck but shall be switchable to 10 lux when not in use. Lighting columns will be in the in the region of 30-35m in height from the pier deck, with approximately 5 nr. required along the length of the pier. The design of the lighting columns and their locations shall be such that the effect on storage areas and traffic movement is minimised with columns positioned along the centreline of the pier. The lighting intensity shall be designed to give acceptable lighting levels for the planned activities within each operational area of the new pier.

2.47 Lighting festoons shall be capable of being lowered to ground level for maintenance and cleaning. Energy efficient bulbs shall be installed in all lighting installations. The location of Navigation light(s) shall be agreed with the Harbour Master, and the Northern Lighthouse Board. The lighting will be designed to prevent direct glare into surrounding properties and illumination of the night sky.

2.48 A shore power supply of 50 Amp supply at 400V 3 phase will be provided from the existing transformer located to directly opposite the base of the pier on the landside. The power supply will be routed to a cabinet located at the approximate midpoint of the pier.

2.49 Fuel export (bunkering) and import facilities are proposed for the new pier. It is proposed that there will be 3 nr. bunkering points on each berth, and 1 nr import point on each berth. Power shall be required to each of these points.

Reclamation

2.50 3 nr. Water supply points will be provided on the reclamation area connecting to the existing supply from either the Jubilee Pier or QE Pier.

2.51 Lighting of 50 lux (average) shall be provided on the reclamation area, switchable to 10 lux when not in use. Lighting columns will be between 30-35m height from the reclamation ground level with approximately 5 nr. columns required on the reclamation. Lighting columns will be positioned toward the seaward end of the reclamation, whilst ensuring the required lighting levels are provided across the entire reclamation area.

2.52 3 nr. power supply points shall be required on the reclamation area to allow for future connections should they be required.

2.1.10 Fencing and Security

2.53 International Ship and Port Facility Security Code (ISPS) compliant security fencing and access gates will be provided at the base of the St. Ola Pier.

2.54 Double access gates will be provided to allow for two-way harbour traffic, including lorries, cranes, coach traffic and reach stackers. A personnel access gate will also be required at the pier entrance. A single security barrier will be provided at the base of the pier as well as a security cabin. The security cabin will be minimum 3.9m x 2.4m x 2.4m ht.

2.55 The existing fencing between the Queen Elizabeth Pier ferry roadway and the rest of the harbour shall be extended to ensure the security of the new reclamation area. A single leaf access gate and a personnel gate are proposed between the reclamation area and the St. Ola Pier.

2.56 CCTV cameras shall be provided at the shore side of the pier, the midpoint and pier end. All CCTV will connect in with the existing SHT security camera system

3 ALTERNATIVES

3.1 The redevelopment of St. Ola Pier relates specifically to the refurbishment and redevelopment of the existing St. Ola Pier. An alternative site located outside the harbour, even if feasible, would result in significantly greater environmental effects than refurbishing the existing St. Ola Pier as it would require the installation and operation of harbour infrastructure in a new location where none presently exists. There are no reasonable alternative sites to be considered in the EIAR. Alternative designs have however been extensively considered.

3.2 The proposed redevelopment is driven by the need to ensure the ongoing structural integrity of the existing pier. Whilst doing so the opportunity has been taken to provide additional berthage for use, particularly by oil and gas supply vessels and cruise ships. Due to the advanced level of pile deterioration, restrictions have been applied to quayside activities on the inner pier. Whilst the outer pier is in significantly better condition, the pier as a whole cannot be utilised to its full potential without remedial works and refurbishment.

3.3 During the outline proposal stage of the project a number of construction methods were considered for the redevelopment:

- A closed face pier solution
- An open piled pier solution
- A partially open pile/closed faced pier solution

3.4 Consideration was given to the anticipated ground conditions on site, the existing structure, effects on harbour wave climate, and also the most favourable structural option from a berthing perspective. It was anticipated that an open pile structure would be excessively costly to construct in comparison to a closed face structure. Additionally, an open piles structure would not allow for beneficial reuse of dredge spoil/crushed concrete within the structure. On the basis of these considerations a closed face pier structure was selected as the preferred construction solution for the redeveloped pier.

3.5 As part of the optioneering phase for the project a number of layouts were considered for the redeveloped pier. Whilst the principal objective of the project is to reinstate St. Ola Pier to a condition in which the pier can be fully utilised, SHT also had a desire to enhance the existing facilities creating a multi-purpose redeveloped quay.

3.6 A number of layouts were considered, including a scenario in which the existing pier was repaired. The options considered have been presented below. Options were assessed on the basis of the following criteria:

- Additional pier/storage area
- Sufficient cruise vessel berthage
- Environmental effects and sustainability
- Future potential of inner and outer harbour
- Discrete quayside working area/dual working berths
- Navigational impact and marine safety
- Potential constraints on dredging and disposal/reclamation
- Impact of construction works
- Estimated cost

'Option 0' - Basecase

3.7 In addition to four new pier layouts, a baseline 'Option 0' was appraised. Within the baseline option, a repair scenario was considered in which the highly corroded inner section of the existing structure was repaired using diver installed plates. In addition to plating repairs of the sheet piles, bearing piles and a new concrete deck were included within the inner section to allow for a comparable level of surcharge loading with the new options. As the outer berth is in relatively good condition it was considered 'as-is' for the purposes of the baseline option. In order to present a comparable level of functionality with other options, the existing structure was required to provide access pontoons to accommodate cruise facilities.

'Option 1' Layout

3.8 Option 1 provided a uniform pier, 32m wide encapsulating the existing structure within the new layout. Two parallel berthing faces will be provided in the inner and outer basins. The proposed deck area will provide 9,565m^2 of pier working area. This layout option provides two full length berthing faces.

'Option 2' Layout

3.9 Option 2 layout encapsulates the existing layout with a tapering 'v' shaped pier. This layout provided a considerable increase in pier working area, with the new deck providing 15,940m^2 of deck space. The tapering layout serves to provide increased storage area toward the shore, whilst avoiding encroachment on the navigational width at the pier head.

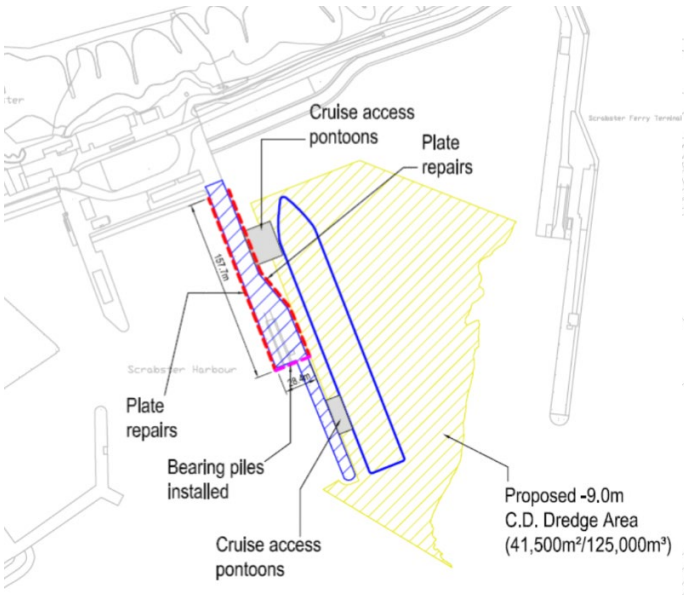

Figure 3.1: Option 0 Layout

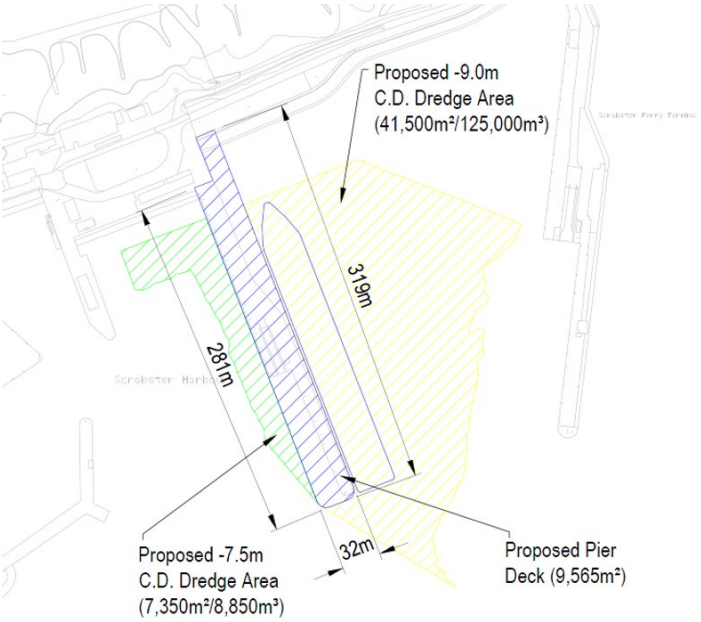

Figure 3.2: Option 1 Layout

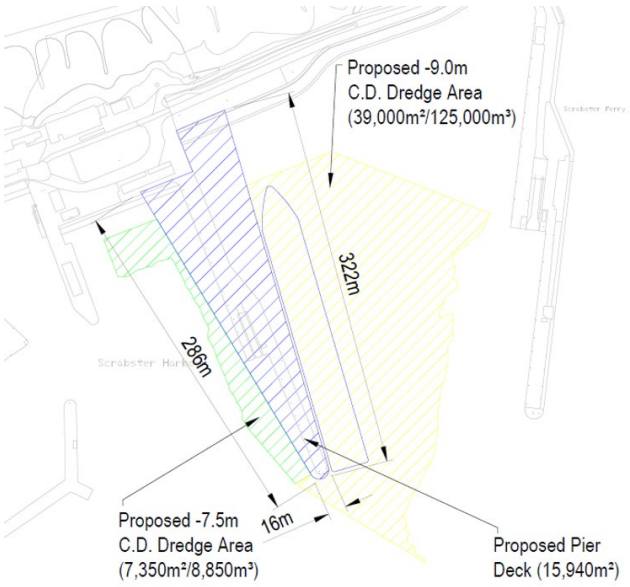

Figure 3.3: Option 2 Layout

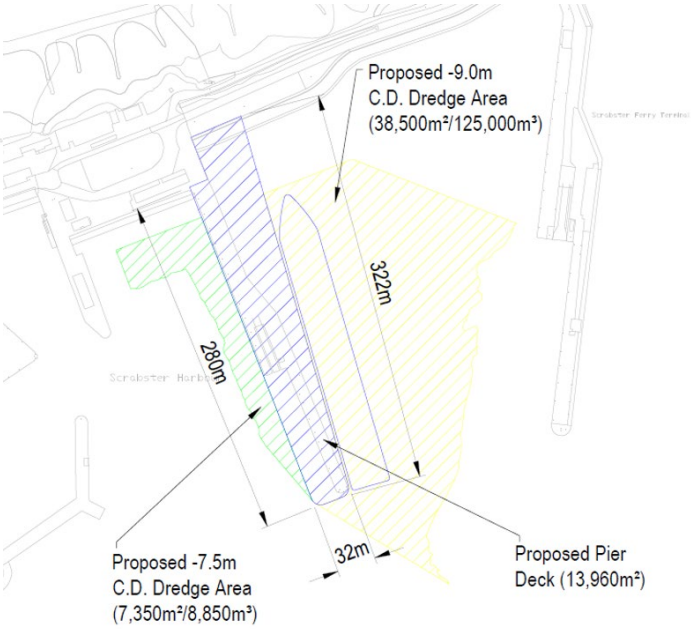

Figure 3.4: Option 3 Layout

'Option 3' Layout

3.10 Option 3 provided a parallel berthing face on the inner basin, and a diagonal outer berthing face allowing for increased width on the inner end of the pier. The proposed layout for Option 3 provided a deck area of 13,960m^2. Option 3 provides increased storage area on the inner end of the pier and avoided impacting the inner berth pocket.

3.11 Option 1 was selected as the proposed redevelopment design.

4 WASTE

4.1 The likely significant effects of the proposed redevelopment of St. Ola Pier, at Scrabster Harbour, in terms of waste related activities during construction phase and operational phase have been assessed. Consideration has been given to the waste that will be generated during demolition and construction phase and the anticipated waste arising during operational phase. Effects from the forecasted waste generation have been assessed in the context of their effects on waste management infrastructure and legislation, policy and strategy targets. Mitigation measures are proposed where significant environmental effects have been identified. The waste chapter also outlines the waste management policies and practices that will be employed at the Harbour.

4.2 The proposed redevelopment will generate construction related waste and once operational the extended capacity at the Harbour may facilitate an increased number of berthing opportunities and the likelihood of increased waste arising associated with additional capacity.

4.3 Localised demolition of the existing concrete deck structure and capping beams will be necessary. The localised demolition will generate Construction, Demolition and Excavation (CD&E) type waste materials. It has been estimated that the demolition works will generate approximately 7,400m^3 of concrete / demolition waste from the decking and capping beam. Dredging shall generate 172,000m^3 of sandy gravel and clay seabed sediment.

4.4 The CD&E waste will be crushed to allow for reuse within the construction works as engineered fill.

4.5 A Best Practicable Environmental Option (BPEO) Assessment has been conducted to identify the potential land based and marine based disposal options for the dredged material and compared them in order to identify the BPEO. It is anticipated that the majority of the dredged material will be disposed of at a licensed offshore disposal site (Scrabster Spoil Ground). It is also anticipated that there will be some reuse of dredged material into the reclamation areas and into the body of the pier if economically feasible.

4.6 In terms of the overall impact of the construction stage, a carefully planned approach to waste management and adherence to a Site Waste Management Plan during construction phase will ensure that the impact on the environmental will be neutral, short term and imperceptible. Contractors working on the site during the works will be responsible for the collection, control and disposal of all wastes generated by the works and the contractor will meet all legal requirements. All wastes will be managed off site under the principles of the waste management hierarchy by reuse, recycling, recovery and disposal to inert, non-hazardous and hazardous waste facilities, as appropriate. There is available capacity within the existing waste management infrastructure

in the Region to manage Construction, Demolition and Excavation waste from the proposed redevelopment. Therefore the effect of the construction phase in relation to waste management is deemed as neutral.

4.7 Scrabster Harbour Trust (SHT) are fully committed to providing adequate waste reception facilities for Scrabster Harbour and operate a Waste Management Plan. Waste management at the port is currently operated to best practice guidance and in accordance with the SHT Waste Management Plan.

4.8 SHT will continue to review and implement any required changes in the waste management plan in order to avoid and minimise the potential effects of ship and generated wastes or cargo residues during the operational phase. SHT will continue to provide adequate reception facilities and remove, as far as is practicable, any disincentives to landing waste in the port. SHT will continue to encourage the responsible management of waste, including minimisation and recycling, at the point of generation on ships, reception in ports/harbours, transportation and disposal, and ensure that port and harbour employees and users dispose of wastes responsibly in facilities provided. From a waste management point of view the site will return to the baseline situation as it is anticipated that due to recycling and reuse policies, procedures and the implementation of the Waste Management Plan, that, while there may be a minor increase in waste arisings there will be no discernible effects to waste management once operational. Therefore the effect of the operational phase in relation to waste management is deemed as neutral.

5 TRAFFIC AND TRANSPORTATION

5.1 This EIAR Chapter takes cognisance of Chapter 4 of 'Transport Assessment Guidance' issued by Transport Scotland relating to Transport Statements, and also addresses the comments received at scoping stage by The Highland Council and Transport Scotland.

5.2 Aspects of the proposed redevelopment that may impact on transportation are:

- Construction related traffic movements during the construction period;
- Transportation activity relating to the 30 additional cruise calls per year and the increase in the number of passengers and crew for each of the existing cruise calls during the operational period;
- Traffic increase due to the increased berthing activity for oil and gas vessels during the operational period.

5.3 The existing access and configuration arrangements at the port access and circulation area remain as existing within the scheme proposals. These will accommodate non-cruise related users, including the increase in oil and gas berthage related to the proposed scheme. The parking, laydown and pick-up facilitates for the coaches and taxis relating to the cruise calls will be accommodated on the renovated pier and will not require additional parking facilities beyond the pier boundary.

5.4 Scrabster Harbour has existing transport arrangements that are well established at the Harbour including vehicular access and circulation, walking, cycling and public transport. Details were provided on the current facilities available for all transport modes and demonstrated that the

existing arrangements combined with the renovated pier are expected to accommodate the additional traffic and people generated the proposed scheme.

5.5 Automatic traffic count data (ATCwas obtained from the Department for Transport to establish the existing traffic flows on the A9 road. Transport Scotland provided supplementary information for this counter that included an hourly breakdown of the two-way vehicle flows for every day in 2018. SHT provided traffic data information relating to the oil and gas berthage activities and information on the operation and management of the existing cruise passengers at the Harbour. Other transportation information was sourced online.

5.6 The two-way Annual Average Daily Traffic (AADT) on the A9 in 2018 was 3,223 with 3.7% Heavy Vehicles. The day with the highest traffic volumes in 2018 was Monday 13 August, when 4,294 AADT occurred on the A9 and a cruise call with 573 passengers was berthed at the Harbour. The day with the second highest traffic volumes in 2018 was Thursday 24 May, when 4,192 AADT occurred on the A9. There was no cruise berthed that day, however the Orkney Folk Festival was being held.

5.7 There has only been one incident of slight severity recorded on the A9 that occurred in 2014, hence in the past three years there have been no recorded traffic collisions on the A9, in the vicinity of Scrabster Harbour. These levels are comfortably below the threshold that would indicate a fundamental safety issue on the local road network.

5.8 National Roads Traffic Forecast (NRTF) medium growth rates have been used to predict further year base traffic flows.

5.9 The report has demonstrated that over 1,350 passengers and crew per cruise call can be accommodated by 352 on the shuttle bus, 1,000 by coach and 40 by taxi. The 30 additional cruise calls per year adds an additional 3,960 vehicles to the road network per year (960 shuttle bus trips, 1,800 coach trips and 1,200 taxi trips).

5.10 It is anticipated that the number of berthages relating to oil and gas could double per year, increasing from approximately 1 every 3 days to 1 every 2 days. The number of HGVs would also double, increasing by 220 movements per year, or 440 HGV trips per year.

5.11 The traffic and transport assessment is robust for the following reasons:

- Walking, hiking, cycling and public transport services are also available at the Harbour. By considering that all the cruise passengers and crew travel by vehicle a robust assessment is provided;
- The assessment assumes that all additional 30 cruise calls have the full capacity of 1,350 passengers and crew. As this is unlikely, hence an additionally robust assessment has been provided;
- The cruise companies work on a basis of only 40-50% of passengers taking an organised excursion, which equates to only 400 to 500 passengers. The assessment is based on capacity for 1,000 passengers on excursions.
- The shuttle bus can be a 22, 41 or 51 seater depending on the size of the cruise vessel. To provide a robust assessment a 22 seater shuttle bus has been considered in this assessment.
- The assessment above is based on the year 2021 when the construction phase is complete and the scheme is operational. Although the construction will be completed in 2021, SHT

have estimated that it will take 5 years of growth post construction before 30 additional cruise vessels and the doubling of the oil and gas berthage to be realised. The assessment of percentage impacts on generated traffic flows against 2021 based year therefore provides an additionally robust assessment.

5.12 The traffic and transport assessment demonstrates that:

- On a typical day the proposed scheme will have a negligible 0.36% percentage impact on the AADT. The percentage impact in heavy vehicles is 7.1%, and particularly the percentage impact in HGVs is 1.3%, which is comfortably below the 30% threshold requested for consideration by Transport Scotland, confirming that further assessment is not required;
- On the worst traffic day, a day when a cruise is already berthed, the proposed scheme will have an impact in the region of 1.4% on the AADT, again this is negligible;
- On an existing day when the traffic flows are at their peak and a cruise isn't currently berthed within the Harbour, the proposed scheme will have a slightly higher impact of 3.1%, providing a minimal impact on the road network.

5.13 Construction traffic flows have been estimated by assessing the 20 Month construction programme and the activity schedule to generate construction traffic. The calculation is based on the working hours contained in the project description, equating to 11 hours per day for 5.5 days per week.

5.14 The results show that on average during the construction period there will be 1,300 construction vehicles generated by the site per month, with 5.4 construction vehicles generated per hour during the working hours.

5.15 The scoping response from Transport Scotland requested that a worst case scenario be considered whereby all of the dredged material (172,000m^3 of sandy gravel and clay) is transported off site by road during the construction period. This has sensitivity testing has been carried out and the results show that this has the effect of increasing the average generated construction vehicles from 1,300 to 2,324 per month, or an average of 9.6 per hour during the working hours.

5.16 Some local members of the public have previously raised concerns in relation to major development at the Harbour regarding the prevention of material and debris falling from construction-related heavy vehicles.

5.17 Mitigation relating to vehicle movements and vehicle emissions is set out in a Dust Management Plan accompanying the EIAR which includes measures to prevent material and debris falling from construction-related heavy vehicles.

5.18 A Construction Traffic Management Plan will be put in place and maintained throughout the construction period to monitor implementation of traffic management . The Contractor will liaise with the Local Authority in implementing its Construction Traffic Management Plan.

5.19 Other projects identified for potential cumulative effects do not have notable traffic movements associated with them. There are no cumulative traffic and transportation effects.

6 AIR QUALITY AND CLIMATE

6.1 The air quality and climate assessment takes account of the effects on air quality due to the proposed redevelopment. The effects of 'Local' and 'Regional' air quality have been undertaken in accordance with the methodology for a 'Simple' assessment, as stated within the Design Manual for Roads and Bridges (DMRB) Advice Note 207/07.

6.2 The incomplete combustion of fuel in vehicle engines results in the presence of hydrocarbons such as benzene and 1,3-butadiene, and sulphur dioxide (chemical formula SO_2), carbon monoxide (chemical formula CO), and particulate matter (size fractions PM_{10} and $PM_{2.5}$) in exhaust emissions. In addition, at high temperature and pressures found within vehicle engines, some of the nitrogen in the air and fuel is oxidised to form NO_X, mainly in the form of nitric oxide (chemical formula NO), which is then converted to nitrogen dioxide in the atmosphere. Nitrogen dioxide is associated with adverse effects on human health. Better emission control technology and fuel specifications ae expected to reduce emissions per vehicle in the long-term.

6.3 The air quality and climate assessment summarises the levels of atmospheric pollution in the coastal area and also provides details on the latest available Highland Councils air quality reports. The air quality assessment considers the likely impacts of the proposal on the local environment and ascertains whether or not the proposed St. Ola Pier redevelopment will lead to a breach of relevant threshold levels of particular atmospheric pollution concentrations. The assessment also summarises the levels of atmospheric pollution in the vicinity of the scheme and also provides details on the local authorities recorded atmospheric pollution and background estimates. Changes in road traffic associated with any scheme has the potential to increase air pollution.

6.4 The impact of the proposal on air quality has been considered for demolition, construction and operational phases of the proposed redevelopment. The assessment also proposes mitigation measures during the demolition and construction phase to ameliorate potential impacts of fugitive dust and construction machinery emissions.

6.5 For the operational phase, impacts of the proposed development were assessed for the year of opening (2021) and the design year (2036). A quantitative assessment was undertaken using a computer model to predict the changes in NO_2 and PM_{10} concentrations that would occur due to emissions generated by the operation of the proposed development (road traffic). The assessment of operational effects considered impacts on existing receptors from road traffic emissions associated with the proposed development. The Highways Agency's DMRB Screening model and the ADMS Roads detailed dispersion computer model has been used to determine the likely NO_2 and PM_{10} concentrations at existing residential receptor locations. Predicted pollutant concentration changes at existing receptors as a result of the proposed development were assessed using the Institute of Air Quality Managers (IAQM) significance criteria. The relevant air quality objectives for $PM_{2.5}$, PM_{10} and NO_2 will not be significantly affected at existing receptors as a consequence of the proposed redevelopment. The national objectives and European limit values for $PM_{2.5}$, PM_{10} and NO_2 for annual mean are highly unlikely to be exceeded in 2021 or thereafter as a consequence of the proposed redevelopment.

6.6 Similarly, the short term objective for PM_{10} and NO_2 of 24-hour mean and 1-hour mean respectively are also within national objectives and European limit values. Improved emission criteria has been outlined within recent EU Directives which relate to vehicles manufactured in the past and in future years. An overall improvement to atmospheric pollutant concentrations

through improved technologies and the utilisation of cleaner fuels means the levels of PM_{10} and NO_2 are expected to continue to decrease. It was concluded that there are no significant local air quality impacts at either human exposure locations or ecological receptors.

6.7 Mitigation measures will see the implementation of measures set out in a Dust Management Plan accompanying the EIAR, there are not predicted to be any significant residual impacts from construction activities. The results of the risk assessment of construction dust impacts undertaken using the Institute of Air Quality Management (IAQM) dust guidance, indicates that before the implementation of mitigation and controls, the risk of dust impacts will be low/medium. Implementation of the mitigation measures described in the IAQM construction dust guidance will reduce the residual dust effects to insignificant.

6.8 The proposed redevelopment is predicted to lead to small increases in annual mean NO_2 and PM_{10} concentrations at the representative human exposure receptor locations within the study area. Importantly, none of these increases exceed the relevant air quality objectives for these pollutants in either the "Do Minimum - without the scheme in place" or "Do Something - with the scheme in place" scenarios.

7 NOISE AND VIBRATION

7.1 A noise and vibration assessment was undertaken of the proposed redevelopment of St. Ola Pier. The assessment considers the potential impacts and likely significant effects of noise and vibration associated with the demolition, construction and operation of the proposed redevelopment.

7.2 The baseline noise monitoring survey was conducted at 2 locations in the vicinity of the proposed redevelopment site in order to characterise the noise environment. The purpose of the baseline noise monitoring was to determine the baseline noise levels at the nearest noise sensitive receptors to the proposed redevelopment and to determine the applicable BS 5228 noise threshold limit.

7.3 The predicted noise impacts are assessed in accordance with BS 5228: Noise and Vibration Control on Construction and Open Sites Noise threshold limits. Based on the proposals, the potential impacts associated with noise are considered for two distinct phases: Demolition, Construction and Installation Phase; and Operational Phase.

7.4 Maximum worst case construction noise levels were calculated assuming that plant will be operating at fixed locations in the absence of mitigation and fully operational throughout the working day. Noise predictions at each receptor are detailed within the chapter and compared with the BS 5288 noise threshold level of 65 dB.

7.5 Worst case predicted noise levels do not exceed the BS5228 noise threshold limit of 65 dB at any of the residential receptor locations. Construction noise predicted noise levels from the construction activities are predicted to be below the relevant noise threshold limits, best practice measures will be employed to ensure that construction phase noise levels are reduced to the lowest possible levels.

7.6 The assessment of road traffic noise in the vicinity of St. Ola Pier concludes that noise impacts from increased traffic resulting from the proposed redevelopment will be negligible during both construction and operational phases.

7.7 During the operational phase, there will be no significant noise impact from the proposed redevelopment at the nearest noise sensitive receptors.

7.8 Mitigation measures recommended during the construction phase include working hours that will be 08:00 to 19:00 hrs Monday to Friday and 08:00 to 13:30 hrs, Saturday and Sunday. Working outside these hours may occasionally be necessary for operational or safety reasons.

7.9 Further construction phase mitigation will comply with British Standard BS5228:2009+A1:2014 – Noise and vibration control on construction and open sites that outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures should be applied by the contractor where appropriate during the construction phase of the pier redevelopment.

7.10 Background noise monitoring will be regularly undertaken during the construction process to ensure noise limits are adhered to. Excessive noise and vibration on site not only represents a major hazard to site workers but it can also annoy neighbours and in some cases disturb adjacent wildlife. Best practice will therefore be implemented in order to minimise noise and vibration and comply with the contents and recommendations of the BS 5228.

7.11 In order to minimise the likelihood of complaints, The Highland Council and affected residents should be kept informed of the works to be carried out and of any proposals for work outside normal hours. All complaints will be recorded by the appointed contractor. The appointed contractor will investigate the circumstances and ensure the necessary corrective measures are taken.

7.12 No specific noise mitigation measures are required at the operational phase.

8 SOILS, GEOLOGY AND HYDROGEOLOGY

8.1 The assessment of soils, geology and hydrogeology was based on a desk study of publicly available information including geological maps, historical borehole logs and maps, consultation with Local Authorities and results of intrusive marine and land-based ground investigations.

8.2 The intrusive investigations identified that the sediment material encountered during the investigation generally comprised sand, gravel and silt which is underlain by Sandstone and Siltstone bedrock. The land based investigation identified that St. Ola Pier is underlain by made ground, sand and glacial till which is underlain by Sandstone and Siltstone bedrock.

8.3 An outline conceptual site model was developed in a Desk Study and Preliminary Risk Assessment which accompanies the EIAR. This model has not identified any potentially significant relevant pollutant linkages for the proposed redevelopment.

8.4 The proposed redevelopment is predominantly occurring within a reclaimed marine environment and therefore the impact to the soils, geology and hydrogeology baseline during both construction and operational phases will be Neutral and Not Significant.

8.5 Mitigation measures in relation to protection of surface water quality are provided within EIAR Chapter 10 Water Quality. No additional soils or geology mitigation is required.

9 COASTAL PROCESSES

9.1 The impact of the proposed redevelopment of the St. Ola Pier and associated dredging on the coastal processes around Thurso Bay and the Pentland Firth was assessed using advanced computational modelling techniques.

9.2 The coastal process model simulations show that the redeveloped St. Ola Pier and outer harbour basin dredging will have no significant impact on either the tidal regime or the wave climate away from the immediate area around Scrabster Harbour. The proposed redevelopment will also not result in any significant impacts on the long term sediment transport regime in Thurso Bay or the Pentland Firth.

9.3 There will be a temporary increase in the suspended sediment concentrations in the water column around the dredge site and the disposal site during the dredging and disposal operations. Generally, the increase is relatively small, for example the increase in Suspended Sediment Concentration (SSC) at the mouth of the Thurso River will peak at about 25 mg/l above background. Mean values are much lower.

9.4 Significant deposits of dredged sediment are only expected to occur around the dump site area. Although the models show deposition in the outer harbour basin, this will be tidied up as part of the final dredging operations. Apart from in the dump site area, there will be less than 1mm of deposition on the sea bed resulting from the redeveloped St. Ola Pier and outer harbour basin dredging. This level of deposition is not significant in terms of the variations that will naturally occur with time in this area.

10 WATER QUALITY

10.1 Proposed redevelopment works of St. Ola Pier have the potential to impact the water quality of nearby areas, and in particular, the Thurso Bay bathing waters and the River Thurso SAC, which is designated for migrating Atlantic salmon. The key issues in relation to water quality are associated with the physical disturbance in the marine environment throughout the construction phase, particularly dredging activities which could potentially increase concentrations of suspended sediments or disperse contaminated sediments and from noise and/ or vibration which could have a detrimental impact to migrating Atlantic salmon in the area.

10.2 Mitigation proposed to offset or reduce the likely impacts to marine biodiversity receptors (Atlantic Salmon) within the River Thurso SAC during the construction phase includes the implementation of marine mammal mitigation in accordance with UK Joint Nature Conservation Committee guidelines during piling operations; scheduling construction activities to avoid major night time operations (particularly impact piling) during peak salmon migration and employing soft start on piling; and implementation of pollution prevention measures to manage risks of accidental pollution release.

10.3 Coastal process modelling of sediment plume dispersal has determined that the impact of the construction activities, i.e. dredging of sediment, will result in localised temporary increase in suspended sediments concentrations in the immediate vicinity of the harbour and the sea disposal site. However, there will be no significant impact on sedimentation within the harbour outside of the immediate area surrounding the site. The magnitude of the potential impacts arising from dredged sediment entering the aquatic environment are therefore considered to be minor with regard to localised water quality and negligible in relation to the wider coastal water body and in particular on the designated Thurso bathing waters.

10.4 Dredge material has been assessed to determine suitability for sea disposal. It was determined that levels of Chromium, Copper and Nickel for 3 boreholes are slightly above the critical action level 1 but far below the critical action level 2 for sea disposal.

10.5 Levels of contaminants within the sediment are below that which would exclude disposal at sea from a regulatory perspective. However, given that complete re-use of the material on site is not feasible and a number of results indicate concentrations of variables between AL1 and AL2, Marine Scotland have determined that sea disposal should be considered on a case by case basis, considering factors such as:

- Extent of contamination- is it localised to a small number of boreholes;
- Level of contamination compared with AL1 and AL2;
- Whether contamination is from historical port related activities or from existing activities/ sources of contamination;
- Natural background concentrations in the vicinity of the site; and
- Existing records of levels of contaminants of concern at the sea disposal site.

10.6 Marine Scotland require the above information to be presented within a Best Practicable Environmental Option (BPEO) report which is included as a technical appendix to the EIAR. It assesses and identifies the most suitable method of disposal. Given all relevant information within the BPEO report, Marine Scotland will make an informed decision as to whether or not the dredge material is suitable for disposal at sea.

10.7 It has also been identified that given the increased vehicular/ shipping activity during both the operation and construction phases there is the potential for oil/ fuel spillage which could negatively impact on water quality. It is possible that an accidental loss of fuel from vessels involved in the proposed redevelopment, or from the installed fuel line could impact negatively on water quality.

10.8 With regards to the potential for oil/ fuel spillages both during the construction and operation phases of the harbour redevelopment, given the distance (> 2 km) of the designated water bodies from the harbour, the magnitude of the impact is considered to be minor however both the Thurso designated bathing waters and the River Thurso SAC water bodies are considered to be of very high importance and the impact is assessed as potentially moderate in the absence of mitigation. However with the mitigation measures proposed for pollution prevention, the likelihood of large spills occurring is extremely low, as this risk will be managed by pollution prevention measures at construction stage and by Scrabster Harbour Trust's Oil Spill Contingency Plan (OSCP) during operational phase of the proposed redevelopment. Any small spills, for example from refilling of a fuel tank(s) would be rapidly diluted and dispersed, and as such the effects of this risk are considered to be negligible.

10.9 The potential for cumulative effects arising from the proposed development, in association with other projects was assessed. Projects which could foreseeably overlap temporally or spatially with the proposed redevelopment, or where construction impacts may be consecutive but cumulative, were considered. It was deemed that there is no potential for spatial overlap of any of the considered projects, therefore the predicted significance of the effects for all assessed impacts is not expected to differ from the predicted significance of the effect of the proposed redevelopment when considered alone.

11 MARINE BIODIVERSITY

11.1 A marine biodiversity assessment, supported by an underwater noise assessment and computational modelling for dredging and spoil disposal was undertaken. To determine baseline conditions of the receiving marine environment a thorough desktop review supplemented by two benthic surveys was undertaken to characterise the physico-chemical properties of sediments to be dredged and benthic marine flora and fauna communities of Scrabster Harbour and the wider Thurso Bay.

11.2 Within the immediate confines of Scrabster Harbour, the dock walls and other artificial rocky areas are likely to host communities of bryozoans, barnacles, mussels, sea squirts and sea anemones, along with seaweeds common to the local area. Intertidal communities outside the harbour are likely to comprise periwinkles, barnacles, mussels, dog whelk and limpets; while common flora may include brown seaweeds such as bladder wrack.

11.3 Habitat classification indicates that subtidal habitat within Thurso Bay is fine sand or muddy sand, with smaller areas of rock. Towards the dredge disposal site, the seabed was characterised by a mix of sand, mud and coarse sediment (i.e. gravels). Communities associated with these sediment types include polychaete worms, molluscs and crustaceans.

11.4 Fish communities within Thurso Bay and the wider area were found are typical of species found within the northern Atlantic, of both of commercial and conservation value. Key fish species likely to be found within and in close proximity to Scrabster Harbour include, sharks, rays and skates, and commercially important species such as herring, sole, mackerel, haddock, plaice and saithe. Basking shark are likely to be found passing through the waters surrounding Thurso bay, particularly during late summer months. Atlantic salmon, sea trout, sea lamprey and European eel, all migratory species, have the potential to be in the area. The River Thurso SAC has been designated for the Atlantic salmon and Thurso Bay (and the wider area) has been identified as spawning and nursery grounds for species such as plaice, saithe and sandeel.

11.5 Based on local catch data, likely shellfish species to be found within Thurso Bay are crabs, lobster, scallop, periwinkle, whelks, mussels, clams, cockles and oysters.

11.6 According to sightings data, harbour porpoise, bottlenose dolphin, white-beaked dolphin, Risso's dolphin, killer whale, minke whale, grey sea and harbour seal are expected to occur in low densities in the waters surrounding Thurso Bay. Marine mammal sightings are likely to be higher in summer months than winter months. Designated sites for harbour porpoise, bottlenose dolphin, grey seal and harbour seal are located within species' foraging distances of the proposed redevelopment.

11.7 A number of potential impacts associated with the installation and operation of the proposed redevelopment on marine biodiversity receptors have been assessed, including temporary and permanent habitat loss, noise emissions, collision risk, increased Suspended Sediment Concentration (SSC), sediment deposition, and accidental pollution events.

11.8 Some permanent and temporary loss of, or disturbance to seabed habitat as a result of construction works is expected within the proposed redevelopment area, however these works are being carried out within an artificial environment (i.e. semi-submerged or submerged man-made structures) and existing high disturbance (due to vessel movements). Due to low abundance and diversity of benthic and shellfish communities, this activity is therefore expected to have very little impact.

11.9 Increased suspended sediment in the water column as a result of construction activities is unlikely to affect benthic habitats, fish and marine mammal species due to the low levels modelled and short duration of dredging activities. Contaminant release from sediments during dredging is unlikely due to the low volume of sediment and levels of contaminates within sediments.

11.10 The noise (source) level for vessel and dredging activities during the installation and operational phases would likely produce underwater noise at similar levels to those vessel movements associated with the operating harbour. In addition, impact piling is likely to produce noise at substantially higher levels than those levels produced by dredging and vessel movements. Noise produced from impact piling and has therefore been considered as worst-case scenario in the assessment of underwater noise on marine mammals during construction.

11.11 Whilst noise impacts associated with the installation of piles have the potential to cause injury and disturbance to marine mammals and fish species, the densities of animals within the zones of possible impact are so small that populations are unlikely to be affected. Injury would require individual animals to remain within a few metres of the noise source for a substantial length of time, and as such injury to individuals is not predicted. Noise from underwater piling will be insufficient to cause death in any fish species and no injury would be caused to fish beyond 28m from the piling activity. The low numbers of fish within Scrabster Harbour, due to continual vessel disturbance, and the low likelihood of fish, eggs or larvae being present within 28m of piling activity means that injury as a result of piling is highly unlikely. Mitigation in the form of marine mammal observation prior to piling and soft start operations will help to mitigate any disturbance predicted. Additionally, Atlantic salmon smolts have been deemed sensitive to piling impacts and piling activities are to be restricted to daylight operations during the months of April and May.

11.12 Increased collision risk to marine mammals as a result of the construction phase is expected to be low, primarily as the increase in number of vessels from the existing levels is only marginal, and vessel speed within the harbour will be low.

11.13 It is possible that an accidental loss of diesel from vessels involved in the proposed redevelopment, or from the installed fuel line could impact negatively on marine biodiversity receptor through toxicological effects or through smothering by oil. However, marine mammals and fish species are highly mobile and are able to detect these pollutants and as a result are expected to avoid areas where pollution has occurred. No seal haul out sites for seals are located within close proximity to Thurso Bay therefore haul out sites are not expected to be affected by any potential spill. Whilst benthic species are more vulnerable to accidental pollution, the likelihood of large spills occurring is extremely low, as this risk will be managed by implementation

of pollution prevention measures at construction stage and by Scrabster Harbour Trust's Oil Spill Contingency Plan (OSCP) during operational phase.

11.14 Use of fuel tank(s) would be in accordance with the requirements of the Water Environment (Controlled Activities) (Scotland) Regulations 2011 and GPP2, Above Ground Oil Storage Tanks. The risk of pollution is low and any small spills that might escape would be rapidly diluted and dispersed, and as such the effects of this risk are considered to be negligible.

11.15 The potential for cumulative effects arising from the proposed redevelopment of the proposed project, in association with other projects was assessed. Projects which could foreseeably overlap temporally or spatially with the proposed redevelopment, or where construction impacts may be consecutive but cumulative, were considered were considered. Underwater noise and increased suspended sediment impacts were considered to have the widest potential impact, and therefore the location of extent of other projects and associated zone of influence of these other projects were assessed on this basis. It was deemed that there is no potential for spatial overlap of any of the considered projects, therefore the predicted significance of the effects for all assessed impacts is not expected to differ from the predicted significance of the effect of the proposed redevelopment when considered alone.

11.16 Potential changes to baseline conditions as a result of climate change and the likelihood of this affecting the assessment of operational impacts was also considered. Due to the nature and scale of the proposed redevelopment, future baseline conditions were not expected to change any assessment of operational impacts.

11.17 The proposed redevelopment will apply appropriate mitigation, as deemed necessary, in consultation with Marine Scotland (MS) and Scottish Natural Heritage (SNH). Proposed mitigation relevant to marine biodiversity receptors includes, the implementation of marine mammal mitigation during the installation of piles, under Joint Nature Conservation Committee (JNCC) piling guidelines; and the proposal to avoid piling during the months of April and May in order to avoid times at which young salmon are known to use Thurso Bay.

12 TERRESTRIAL BIODIVERSITY AND ORNITHOLOGY

12.1 A terrestrial biodiversity and ornithology assessment was undertaken, supported by habitat, otter and breeding bird survey and computational modelling for dredging and spoil disposal. The terrestrial habitat present within the harbour is predominantly hardstanding and commercial/residential buildings with, of which none are protected under national or international law. The site is, however, used by otter which are European protected species under the EU Habitats Directive. Otter surveys identified that their use of the site is infrequent and therefore it is unlikely that the site is of significant importance to the local population of this species.

12.2 The proposed redevelopment will cause only a temporary loss of habitat, with an overall increase in the habitat extent following the reinstatement of rock armour revetment between the St. Ola and Queen Elizabeth Piers. As part of mitigation measures for otter, prior to construction operations commencing a pre-construction survey will be undertaken to ensure that the baseline conditions have not changed since the original assessment and otter use of the area has remained infrequent.

12.3 The construction and operational effect of the St. Ola Pier redevelopment on otter is only going to be present in the short-term and will only have a minor/negligible impact on the species.

12.4 Scrabster Harbour lies c.200m south of the North Caithness Cliffs SPA, designated under the EU Birds Directive due to its importance for breeding birds, namely: peregrine and guillemot, as well its breeding seabird assemblage of puffin, razorbill, kittiwake, fulmar and guillemot. Surveys undertaken during the summer of 2018 found the intertidal habitat present within Scrabster Harbour was used by small fractions of the overall SPA populations for foraging.

12.5 The construction phase may cause temporary low level disturbance at the section of the SPA closest to the Harbour over the short term, with only a minor effect and overall not significant. SPA qualifying species within 500m of the Scrabster Harbour Redevelopment during the construction phase will be impacted by a small amount of habitat loss due to the reclamation of land and extension of St. Ola Pier, temporary disturbance caused by the construction works, increased suspended sediment concentrations and accidental pollution release; all of which were assessed as being of low to negligible magnitude and not significant due to the implementation of pollution prevention measures at construction stage.

12.6 The operational phase of the redevelopment will see an increase in the amount of vessel traffic causing the potential for accidental spillages to contaminate the marine environment. This was assessed as being of negligible magnitude and not significant due to implementation of a Harbour Oil Spill Contingency Plan (OSCP) at operational stage.

13 INTERACTIONS

13.7 The EIA Directive and its transposing Regulations requires that in addition to assessing impacts on those environmental aspects scoped in for assessment, the interrelationship between those aspects must be taken into account as part of the environmental assessment.

13.8 Table 13.1 below is a matrix table indicating the significant interactions that are likely to occur between the various environmental disciplines with regard to the proposed development. Where a cross exists in a box in the table, this indicates that a relationship exists between the two environmental areas. The purpose of the table is to allow interaction between various disciplines to be recognised, although the level of interaction will vary in each case.

13.9 It is assumed in presenting this table that an environmental discipline has a potential inter-relationship both during the construction and operational phases of the development.

13.10 A summary of expected interactions is given in Table 13.2.

Table 13.1: Inter-relationship Matrix – Potential Interaction between Environmental Aspects

	Waste	Soils, Geology and Hydrogeology	Water Quality	Biodiversity	Air Quality and Climate	Noise and Vibration	Traffic and Transport
Waste		X	X	X	X	X	X
Soils, Geology and Hydrogeology	X		X	X			
Water Quality		X		X	X		X
Biodiversity	X	X	X		X	X	X
Air Quality and Climate		X	X	X			X
Noise and Vibration	X			X			X
Traffic and Transport	X		X	X	X	X	

Table 13.2: Summary of Interactions

Environmental Aspect	Interacts with	Description
Waste	*Soils, Geology and Hydrogeology*	Dredged seabed sediments are waste arisings and require management
	Water Quality	Ineffective waste management can result in pollution and deterioration of water quality
	Biodiversity	Ineffective waste management can result in pollution and affect biodiversity features of value
	Air Quality and Climate	More waste arisings may require more off-site management. This can result in greater levels of traffic on the road network giving rise to greater aerial emissions.
	Noise and Vibration	More waste arisings may require more off-site management. This can result in greater levels of traffic on the road network giving rise to greater levels of road traffic noise.
	Traffic and Transport	More waste arisings may require more off-site management. This can result in greater levels of traffic on the road network.
Soils, Geology and Hydrogeology	*Water Quality*	Geological sediments require removal by dredging and disposal at sea. Associated suspended sediment plumes can result in deterioration of water quality.
	Biodiversity	Geological sediments shall be dredged and disposed at sea. Associated suspended sediment plumes can result in displacement of marine biodiversity features.
Water Quality	*Biodiversity*	Pollution of marine waters, elevated suspended sediments and deterioration of water quality can cause disturbance to key species and displacement of prey items of marine and avian biodiversity features.
	Air Quality and Climate	Significant levels of aerial emissions can result in subsequent deposition in the marine environment and cause deterioration of water quality.
	Traffic and Transport	Greater levels of traffic on the road network increases the risk of accidental spillages and increases the levels of contaminants in routine road runoff which discharges to surface waters and coastal waterbodies.
Biodiversity	*Air Quality and Climate*	Significant levels of aerial emissions can result in subsequent deposition in nearby or downwind habitats, resulting in habitat deterioration effects.

	Noise and Vibration	Increased levels of noise can disturb or displace species, or mask key calls and communication, resulting in habitat deterioration effects.
	Traffic and Transport	Greater levels of traffic on the road network increases the risk of accidental collision with wildlife.
Air Quality and Climate	*Traffic and Transport*	Greater levels of traffic on the road network increases the level of aerial emissions. This can cause deterioration of ambient air quality.
Noise and Vibration	*Traffic and Transport*	Greater levels of traffic on the road network increases background noise due to the increased contribution of road traffic noise.