



Tay Road Bridge Joint Board

TAY ROAD BRIDGE RESURFACING

Habitat Regulations Appraisal Screening Report





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TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70075400-ECO

OUR REF. NO. HRA_SCREENING

DATE: JUNE 2022

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	First draft			
Date	24 May 2022			
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Authorised by	Claire Hopkins			
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Project number	70075400-ECO			
Report number	HRA_screening			
File reference	\\uk.wspgroup.com\central data\Projects\70075xxx\70075400 - Tay Bridge Pavement Study\03 WIP\EC Ecology\05 Reports			



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1 INTRODUCTION

The Tay Road Bridge Joint Board is currently planning the resurfacing of the full extent of the Tay Road Bridge in Dundee, Scotland. The Bridge carries the A92 dual carriageway over the Firth of Tay between Dundee on the north side of the estuary and Newport-on-Tay, Fife on the south side.

Part of the Firth of Tay is designated as Special Protection Areas (SPA), as a Ramsar wetland and as a Special Areas of Conservation (SAC) (see **Section 3** and Appendix A - **Figure 1** for details). Several parts of the firth are within a Site of Special Scientific Interest (SSSI). The Firth of Tay is noted for its extensive sand and mudflats, population of harbour seals and wintering birds.

WSP has been commissioned by the Tay Road Bridge Joint Board (hereafter the 'Client') to undertake a Habitats Regulations Appraisal (HRA) screening assessment of the bridge resurfacing (the 'Proposed Development'). The screening assessment will determine whether the Proposed Development presents any likely significant effects (LSEs) on the qualifying interests of the relevant designated sites, and hence whether or not an Appropriate Assessment (AA) for adverse effects on the integrity of the sites will be required.

1.1 Project Background

The Tay Road Bridge carries the A92 road across the Firth of Tay (Appendix A - **Figure 2**). It is a 2,250 m long structure with a composite twin box girder and reinforced concrete deck. The bridge is 9.75 m above sea-level at the Dundee side and 38.1 m above sea-level in Fife. A suite of investigations were undertaken on behalf of the Tay Road Bridge Joint Board. The existing surfacing on the bridge is the original as installed in 1966. Detailed investigations of the existing pavement in 2020 confirmed that it is now fast approaching the end of its serviceable life and should be replaced. The resurfacing will replace the existing asphalt pavement and repair the existing concrete deck. Further investigations and trial works were undertaken in September 2021 to ascertain the condition of the concrete deck and the presence of any waterproofing. It was identified that there is no waterproofing present on the concrete deck and the surface is variable, so waterproofing will be required. Subsequent preparatory work will be required to ensure the deck is prepared to a level that it can accept the waterproofing system and improve the integrity of the bridge deck.

A review of the existing maintenance record information identified that the majority of the expansion joints were more than 30 years old and starting to fail at an increasing rate, therefore all joints would also need to be replaced as part of the resurfacing project.

An underdeck survey was carried out in April 2021, which identified a number of defects to the reinforced concrete soffit associated with the historic ingress of water through defective expansion joints. Therefore, it was decided to also utilise the carriageway closures for the resurfacing works to gain access to the bridge deck cantilevers and undertake the necessary repairs.

1.2 The Habitats Regulations

1.2.1 National Legislation

In Scotland, the Scottish Parliament has now passed the UK Withdrawal from the European Union (Continuity) (Scotland) Act (hereafter the EU Continuity Act), meaning that Scottish legislation in relation to devolved matters - including environmental matters - will remain aligned with EU law. As such, the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) ('The Habitats Regulations') which translated European Council Directive 92/43/EEC 'the Habitats Directive' into Scottish law applies to plans and projects that may have significant effects on sites designated under the Habitats Directive and classified under the Wild Birds Directive (Council Directive 79/409/EEC). Sites designated under the Directives include Special Protection Areas (SPAs) and Special Areas of Conservation (SACs).

Under Scottish Planning Policy (Scottish Government, 2014), the effects of plans and projects on candidate SACs and proposed SPAs, and Ramsar sites (Wetlands of International Importance under the 1971 Ramsar Convention), should also be assessed.

The Habitats Regulations place a duty upon 'Competent Authorities', to consider the potential for effects upon International Sites prior to granting consent for projects or plans. Consent for the Proposed Development is required from the Tay Road Bridge Joint Board.

Should LSE be identified by the initial screening process it is necessary to further consider the effects by way of an AA. Overall, this process of assessment is known as Habitats Regulations Appraisal and further details of the applicable legislative context are summarised below.

Article 6 (3) of the Habitats Directive sets out the need for AA of plans or projects which have potential to affect the integrity of SACs and SPAs (referred to as 'Natura 2000 Sites' in the Habitats Directive):

'Any plan or project likely to have a significant effect on a Natura 2000 Site, either individually or in combination with other plans or projects, shall undergo an Appropriate Assessment to determine its implications for the site. The competent authorities can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site concerned' (Article 6.3).

As the purpose of the Natura 2000 network is preservation of examples of species and habitats across Europe, rather than preservation of individual sites, Article 6 (4) allows for exceptional circumstances where negative effects may be permitted. This reads:

'In exceptional circumstances, a plan or project may still be allowed to go ahead, in spite of a negative assessment, provided there are no alternative solutions, and the plan or project is considered to be of overriding public interest. In such cases the Member State must take appropriate compensatory measures to ensure that the overall coherence of the Natura 2000 Network is protected.' (Article 6.4).

As a result of EU exit, information relating to the UK's existing SACs and SPAs that were within the Natura 2000 network has been transferred to the Emerald Network database. The Emerald Network was established under the 1989 Bern Convention as an ecological network made up of Areas of Special Conservation Interest; the network of Natura 2000 sites was created to meet the EU's obligations under the Bern Convention.

Regulation 48 (1) of the Habitats Regulations states:

'A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for a plan or project which—

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site,

—must make an Appropriate Assessment of the implications for that site in view of that site's conservation objectives.'

Like the Habitats Directive, the Habitats Regulations also make allowance for projects or plans to be proceeded if they satisfy 'imperative reasons of overriding public interest' (IROPI). Regulation 49 relates to such situations.

The Competent Authority is required to consult NatureScot (the statutory nature conservation body in Scotland) in all cases where an AA is required.

With reference to Scottish Planning Policy, Ramsar sites and European Sites are collectively referred hereafter as 'International Sites'.

1.3 Stages of Habitats Regulations Appraisal

Guidance on the Habitats Directive (European Commission, 2000a) sets out the step-wise approach which should be followed to enable Competent Authorities to discharge their duties under the Habitats Directive and provides further clarity on the interpretation of Articles 6 (3) and 6 (4). The process used is usually summarised in four distinct stages of assessment:

- Stage 1: Screening: the process which identifies whether effects upon a [International Site] of a plan or project are possible, either alone or in combination with other plans or projects, and considers whether these effects are likely to be significant;
- Stage 2: Appropriate Assessment: the detailed consideration of the effect on the integrity of the European Site of the plan or project, either alone or in combination with other plans or projects, with respect to the site's conservation objectives and its structure and function;
- Stage 3: Assessment of alternative solutions: the process which examines alternative ways of achieving the objectives of the plan or project that avoid adverse effects on the integrity of the [International Site]; and
- Stage 4: Assessment where no alternative solutions exist and where adverse effects remain: an assessment of whether the development is necessary for IROPI and, if so, of the compensatory measures needed to maintain the overall coherence of the [International Site] network.

1.4 Guidance

In undertaking this HRA, the following guidance was referred to:

- Convention on Wetlands of International Importance especially as Waterfowl Habitat. Ramsar (Iran), 2 February 1971. UN Treaty Series No. 14583. As amended by the Paris Protocol, 3 December 1982, and Regina Amendments, 28 May 1987.
- Department for Communities and Local Government (August 2006) Planning for the protection of European Sites: Appropriate Assessment. Guidance for Regional Spatial Strategies and Local Development Documents. Draft.
- European Commission Guidance document on the strict protection of animal species of Community interest under the Habitats Directive'
- Transport Scotland (2020) Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 115 Habitats Regulations Assessment (formerly HD 44/09) Revision 1
- Transport Scotland (2020) Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 108 Biodiversity (formerly Volume 11, Section 3, Part 4 Ecology and Nature Conservation and IAN 130/10) Revision 1
- Transport Scotland (2020) Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 105 Air Quality (formerly HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15) Revision 0
- Transport Scotland (2020) Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 111 Noise and Vibration (formerly HD 213/11, IAN 185/15) Revision 0
- Joint Nature Conservation Committee (JNCC) (2016). SAC and SPA Standard Data Forms and Ramsar Information Sheets. Available online: <http://www.jncc.gov.uk/>. Accessed [27/04/2020];
- Scottish Natural Heritage (SNH) (2016) NatureScot guidance on assessing connectivity with Special Protection Areas;
- SNH (2018). NatureScot guidance on the handling of mitigation in Habitats Regulations Appraisal;
- Tyldesley, D. and Chapman, C. (2013) The Habitats Regulations Assessment Handbook (July 2020 Edition) UK DTA Publications Ltd.
- NatureScot (2018). Guidance Note. The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement.

1.5 HRA Policy Guidance

- Council of the European Union (1992). Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora. Available online: <http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:31992L0043>. Accessed: [09/06/2022]
- Council of the European Union (2009). Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds. Available online: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV:ev0024>. Accessed: [09/06/2022]
- Department for Housing, Communities and Local Government (DHCLG) (2021). National Planning Policy Framework.
- European Communities (2007). Guidance document on Article 6 (4) of the 'Habitats Directive' 92/43/EEC; Available online: http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf Accessed: [09/06/2022]

2 PROPOSED DEVELOPMENT

The Proposed Development will be undertaken in two phases, utilising carriageway closures with contraflow traffic management. As the below steps are undertaken on the top deck the carriageway closures will allow access to the bridge deck cantilever soffits to undertake the necessary concrete repairs to maintain the integrity of the structure (see **Additional Step** below).

Step 1

The work will begin with refurbishment works by removing the existing surfacing and expansion joints. This will be done by planing (cold milling) down to a safe depth to avoid damage to the concrete deck, after which the remainder of the bituminous surfacing will be removed by scraping using excavators (Appendix A -

Figure 4). The existing kerbs will also be fully removed from both sides of the carriageway. Scabbling and captive shot blasting will then be required to smooth the concrete deck surface in preparation for receiving a waterproofing system (Appendix A - **Figure 5**). Localised concrete repairs will also be made as necessary.

Step 2

Once the deck has been suitably prepared it will be waterproofed with a two-coat spray applied system (Appendix A - **Figure 6**). The waterproofing system will contain a methyl methacrylate or polyurethane spray applied membrane. The waterproofing will take approximately one month on either side and will apply roughly 63,000 L of liquid to the surface of the bridge over the two applications. This will cover the entire surface of the bridge deck and on both concrete upstands. Once cured the new kerbs will be installed along the inner and outer upstands. The expansion gaps and gullies will then be covered with plates prior to laying the new surfacing material. The surfacing material will be laid using modern conventional pavers (Appendix A - **Figure 6**) along the full length of the bridge at depths varying between approximately 40 and 120 mm. The surfacing will vary between being laid in either one or two courses (layers) depending on thickness required.

Step 3

Once the surfacing has been laid, at the expansion gaps in the deck, strips of asphalt will be cut out to allow for installation of the new expansion joints. They will consist of a variety of joint types including buried joints, elastomeric in metal rail joints and mat type expansion joints appropriate for the relative movement range at each span. On completion of the expansion joint installation, final works will include the installation of white lining before the reopening of the carriageway to traffic. This work will be undertaken on one carriageway over the summer months and then repeated the following year on the opposite carriageway using the same methodology.

Additional Step

As all the work above is progressing the concrete repairs to the reinforced concrete soffit will be undertaken at various stages ensuring this does not disrupt the progress of the top of deck works. Step 1 – 3 above will all be undertaken within the confines of the bridge deck and carriageway; however, this additional step will be to the underside of the concrete bridge decks. Therefore, the concrete repairs will require proprietary scaffold access as the existing mobile access gantries are in the process of being replaced and in their existing condition cannot be relied upon to facilitate these



works. The method of repair will require hydro-demolition (Appendix A - **Figure 8**) around the existing defects to expose the steel reinforcement and provide a suitable key to cast in the new repair material.

The repair area will be fitted with sacrificial anodes to prevent ongoing corrosion and prevent the formation of new adjacent corrosion sites. The concrete repair material will be spray-applied due to the depths required and then trowel-finished. The required hydro-demolition will produce lumps of concrete to break away from the underside of the bridge. Debris netting (Appendix A - **Figure 9**) will be installed around the area being demolished to catch debris, however this will not catch concrete fines contained within the water. There will also be possible contaminant run-off due to waterproofing and use of machinery and a risk of spillages.

2.1 Programme

It is anticipated that the works will be undertaken as follows:

Phase 1 – May 2023 to September 2023

Phase 2 – April 2024 to August 2024

Information on the detailed design of the Proposed Development and construction program is limited at this stage as the project is currently progressing through the preliminary design stage.

3 STAGE 1 SCREENING ASSESSMENT

3.1 International Sites

For the screening exercise International Sites and their ecological features with the potential to be affected by the Proposed Development were identified based on their proximity as well as their potential to be connected, either directly (e.g., via watercourses) or indirectly (e.g., whereby associated qualifying species use habitats within, or in proximity for foraging or roosting (termed ‘functionally linked’ habitat)). This is described as the Proposed Developments Zone of Influence (ZoI).

This is likely to extend beyond the Proposed Development Site, for example where there are ecological or hydrological links beyond the site boundaries.

In the marine environment, zones of influence can be extensive e.g., pollution and materials can easily be transported elsewhere, currents and waves can be altered causing effects well beyond the Site and effects on mobile species may be manifest elsewhere. With all that taken into consideration the following search parameters are:

- All SACs designated for habitats and Ramsar sites up to 10 km from the Site,
- All SACs designated for relevant mobile species are as follows (based on species’ behaviour described in (Russell et al., 2013)¹:
 - Up to 100 km for the Grey seal;
 - Up to 20 km for the Harbour seal;
- SPAs up to 20 km from the Proposed Development (maximum foraging distance based on Greylag goose and Pink-footed goose).

Table 3-1 provides details of the Qualifying Interests (QI) of each of the International Sites identified within the ZoI of the Proposed Development, the approximate distance and direction of each International Site, and if there is potential connectivity. The locations of these International Sites in relation to the Proposed Development are shown on **Table 3-1**.

Table 3-1 – International Sites and Qualifying Interests

SITE NAME	DESIGNATION	PROXIMITY TO SITE	ASSESSED QUALIFYING INTERESTS
Firth of Tay and Eden Estuary	SAC	Within the Site. As this is an estuarine environment there is the potential from any runoff from development	Annex I habitats that are a primary reason for selection of this site: Estuaries Annex I habitats present as a qualifying feature, but not a primary reason for selection of this Site: <ul style="list-style-type: none"> ● Sandbanks which are slightly covered by sea water all the time ● Mudflats and sandflats not covered by seawater at low tide

¹ There is evidence that the resident bottlenose dolphin of the Moray Firth (265km north of the Site) forages in the Tay. However, as the Proposed Developments effects will be small and localised and the bottlenose dolphin uses the East Scotland Management Unit (see Appendix A - Error! Reference source not found. and Quick *et al.* 2014) to forage so is not reliant on the River Tay area, the potential effects would be considered *de minimus* and therefore it has not been included in the screening assessment.

SITE NAME	DESIGNATION	PROXIMITY TO SITE	ASSESSED QUALIFYING INTERESTS
		to move up or downstream.	<p>Annex II species that are a primary reason for selection of this Site:</p> <ul style="list-style-type: none"> Harbour seal <i>Phoca vitulina</i> <p>Annex II species present as a qualifying feature, but not a primary reason for Site selection.</p> <p>N/A</p>
Outer Firth of Forth and St Andrews Bay Complex	SPA	1 km from the boundary at the Firth of Tay. This SPA stretches to the south at St Andrews Bay and the Firth of Forth.	<p>Annex 1 populations of European importance, nonbreeding:</p> <ul style="list-style-type: none"> Red-throated diver <i>Gavia stellata</i> Slavonian grebe <i>Podiceps auritus</i> Little gull <i>Larus minutus</i> <p>Breeding:</p> <ul style="list-style-type: none"> Common tern <i>Sterna hirundo</i> Arctic tern <i>Sterna paradisaea</i> <p>Migratory populations of European importance, non-breeding:</p> <ul style="list-style-type: none"> Eider <i>Somateria mollissima</i> Waterfowl assemblage Long-tailed duck <i>Clangula hyemalis</i> Common scoter <i>Melanitta nigra</i> Velvet scoter <i>Melanitta fusca</i> Goldeneye <i>Bucephala clangula</i> Red-breasted merganser <i>Mergus serrator</i> <p>Breeding:</p> <ul style="list-style-type: none"> Shag <i>Phalacrocorax aristotelis</i> Gannet <i>Morus bassanus</i> <p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> Puffin <i>Fratercula arctica</i> Kittiwake <i>Rissa tridactyla</i> Manx shearwater <i>Puffinus puffinus</i> Guillemot <i>Uria aalge</i> Herring gull <i>Larus argentatus</i> <p>Seabird assemblage, non-breeding:</p> <ul style="list-style-type: none"> Black headed gull <i>Chroicocephalus ridibundus</i> Common gull <i>Larus canus</i> Herring gull Guillemot Shag Kittiwake Razorbill
Firth of Tay and Eden Estuary	SPA and Ramsar	2 km west of the Site. The Ramsar site also	<p>The Site supports an internationally important assemblage of wintering waterfowl including internationally important populations of several species. Fourteen species of bird breed in nationally important numbers.</p> <p>Qualities under Article 4.1 by:</p>

SITE NAME	DESIGNATION	PROXIMITY TO SITE	ASSESSED QUALIFYING INTERESTS
		<p>includes estuarine habitats at the mouth of the Tay Firth at Monifieth (Angus) and to St Andrews Bay.</p>	<p>regularly supporting breeding populations of European importance of the Annex I species: [redacted]</p> <p>Qualifies under Article 4.2 by:</p> <p>regularly supporting non-breeding populations of European importance of the migratory species:</p> <ul style="list-style-type: none"> • Redshank <i>Tringa tetanus</i> • Greylag goose • Pink-footed goose <p>Qualifies under Article 4.2 by:</p> <p>Regularly supporting in excess of 20,000 individual waterfowl over winter (non-breeding)</p> <ul style="list-style-type: none"> • Velvet scoter <i>Melanitta fusca</i> • Pink-footed goose • Greylag goose • Redshank • Cormorant <i>Phalacrocorax carbo</i> • Shelduck <i>Tadorna tadorna</i> • Eider <i>Somateria mollissima</i> • Bar-tailed godwit • Common scoter • Black-tailed godwit <i>Limosa limosa islandica</i> • Goldeneye • Red-breasted merganser <i>Mergus serrator</i> • Goosander <i>Mergus merganser</i> • Oystercatcher <i>Haematopus ostralegus</i> • Grey plover <i>Pluvialis squatarola</i> • Sanderling <i>Calidris alba</i> • Dunlin <i>Calidris alpina alpina</i> • Long-tailed duck <i>Clangula hyemalis</i> <p>Qualifies under Ramsar criteria 5 (internationally important numbers of wintering wildfowl) and 6 (species/populations occurring at levels of international importance of Pink-footed goose, Greylag goose and Bar-tailed godwit).</p>
Isle of May	SAC	35 km	Grey seal <i>Halichoerus grypus</i>
Berwickshire and North Northumberland Coast	SAC	70 km	Grey seal

3.1.1 Marine Mammals

3.1.1.1 The Firth of Tay and Eden Estuary SAC

The Firth of Tay and Eden Estuary SAC supports a nationally important breeding colony of Harbour seals *Phoca vitulina*, which form part of the east coast population of seals that typically utilise sandbanks. Harbour seals are found on sandflats and estuaries, and on rocky shores in Scotland. As pups swim almost immediately after birth, seals can breed on sheltered tidal areas where banks allow access to deep water. Seals may range widely in search of prey, but individuals often return to favoured haul-out sites. The intertidal sandflats of Abertay Sands, Broughty Ferry, Buddon and Eden mouth provide haul outsites (i.e., to rest, pup and moult). Abertay Sands is the busiest of the sites, used by the Harbour seal and the Grey seal (Hanson et al., 2017). A seal population of approximately 600 adults have historically moved freely within this site from the inner Tay Estuary to the Eden mouth. However, the breeding population dropped by over 90% from over 600 to 40-50 by 2014 with the cause still unclear (Hanson et al., 2017, HRA Guidance NatureScot, 2019). The number of seals hauling out in the vicinity of the Proposed Development is now extremely low (Appendix A - **Figure 10**).

Harbour seals daily foraging range is limited to around 20 km and over the longer term there is interchange between animals on different haul-outs. This is demonstrated in the movement between the Tay and the Forth for foraging and seasonally. Pupping is during June-July followed by an adult moulting period in August – September (HRA Guidance NatureScot 2019) which is at the same time as construction for the Proposed Development.

The Firth of Tay and Eden Estuary SAC Conservation Objectives for Harbour seal are:

- To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained, and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and,
- To ensure for the qualifying species that the following are maintained in the long term:
 - Population of the species as a viable component of the site;
 - Distribution of the species within site;
 - Distribution and extent of habitats supporting the species;
 - Structure, function and supporting processes of habitats supporting the species; and
 - No significant disturbance of the species.

Harbour seals within the Firth of Tay and Eden Estuary SAC are in *unfavourable/declining* condition.

3.1.1.2 The Isle of May SAC

The Isle of May is located 35 km away to the east of the Tay Bridge. This site supports a breeding colony of Grey seal *Halichoerus grypus*, with the largest east coast breeding colony of Grey seals in Scotland, and the fourth-largest breeding colony in the UK (JNCC, 2021). Seals from this population potentially haul out near the Proposed Development (Appendix A - **Figure 10**).

Grey seals forage in the open sea and return regularly to haul out on land where they rest, moult and breed. They may range widely to forage and frequently travel over 100 km between haul-out sites. Foraging trips last anywhere between 1 and 30 days. These can involve long distance movements, with some individuals crossing the North Sea from Britain to the European mainland as far afield as Norway (HRA Guidance, NatureScot 2019).

In September to late November females congregate on secluded beaches to pup and are joined by smaller numbers of dominant males who mate with them post-pupping. In some places large numbers of seals are found in high densities, such as on the Isle of May. For the remainder of the year, they disperse widely around Scotland and further afield and are recorded within the area of the Proposed Development (Appendix A - **Figure 10**).

Grey seals within the Isle of May SAC are in *Favourable Maintained* condition.

3.1.1.3 Potential Effects of the Proposed Development on Marine Mammals

Potential effects on marine mammals from this Proposed Development are:

- Water quality affecting prey availability due to fines released from concrete during hydro-demolition.
- Water quality affecting prey availability due to contaminants from waterproofing² and machinery (run-off and accidental spillage).
- Water quality due to air borne dust produced by various activities.
- Disturbance of haul out sites caused by noise from machinery, lights and presence of personnel.

Indirect impacts due to changes to water quality from concrete fines, airborne dust or waterproofing and machinery cannot be ruled out at this stage for any of the marine mammal species that forage in this area. The waterproofing liquid will contain methyl methacrylate or polyurethane spray applied membrane.

Methyl methacrylate - can have acute and chronic impacts on marine life (Npi.gov.au 2019). However, due to the quantity used over the entire bridge surface and the fact that this activity will be on the bridge surface it is highly unlikely to reach marine system in quantities that would have impact. This substance is broken down by microorganisms in the water (Npi.gov.au 2019).

Polyurethane is a plastic material. This is a plastic and small amount could be broken down into micro plastics, there may be an uptake by plankton that will bioaccumulate through the food chain and eventually may be ingested by fish (Róisín Coyle et al., 2020).

Concrete fines in water produced by hydro demolition may enter the system, as this work will be undertaken under the bridge the quantity of concrete fines which will escape through the netting during construction works is at the time of writing unclear. Concrete is highly alkaline and can be very corrosive and can cause serious pollution to water, additionally the components of the concrete and other bridge materials that may escape are unknown. Therefore, the impact of on water quality affecting prey availability for qualifying interests cannot be ruled out at this stage.

Seals spend time outside the water (hauling out) for breeding and moulting and are sensitive to a broader range of sound frequencies in water than in air (Southall et al. 2007). Current audiometric data for seals states loud construction sounds are expected to be audible to at least 500 m in air. The nearest potential haul out site is over 1 km away to the west. As the work is temporary and harbour seals do not make large scale movements between haul out sites in response to disturbance, and when they have been disturbed most return to the same haul out site despite past disturbance (Paterson, Russell and Wu, 2019). In addition to the temporary nature of this work; the noise, light and addition of personnel is not considered novel in this area. The bridge is a busy road connected to a busy city, where routine maintenance operations form part of the background noise and disturbance and therefore the seals will be habituated to activity on this bridge. In addition, the level of noise will be reduced or remain the same as it is currently with the introduction of the counterflow system.

² The waterproofing liquid will contain "methyl methacrylate" or "polyurethane" spray applied membrane and an estimated 63,000L will be used over two applications which will take an estimated month on either side of the bridge.

Table 3-2 Results of Assessment for LSE on Marine Mammals

DESIGNATED SITE	QUALIFYING FEATURE	POTENTIAL EFFECT	LSE RESULT
The Firth of Tay and Eden Estuary SAC	Harbour seal	Changes in water quality	Yes. There is a pathway and although impacts are unlikely there is a risk.
		Disturbance of seal haul out sites	Although a pathway was identified it is considered highly unlikely the Proposed Development will result in a significant effect on seal haul out behaviour.
The Isle of May SAC	Grey seal	Changes in water quality	Yes. There is a pathway and although impacts are unlikely there is a risk.
		Disturbance of seal haul out sites	Although a pathway was identified it is considered highly unlikely the Proposed Development will result in a significant effect on seal haul out behaviour.

3.1.2 Ornithology

3.1.2.1 The Outer Firth of Forth and St Andrews Bay Complex SPA

The Outer Firth of Forth and St Andrews Bay Complex SPA is located 1km to the east of the Proposed Development. This marine area has one of the largest and diverse marine bird concentrations in Scotland and is designated for a total of 21 seabird and waterbird species (SNH & JNCC, 2017). It contains many sheltered areas, such as firths, inlets and sandy bays, used by seabirds and waterbirds to feed, moult, rest and roost. Birds lie close to the nesting sites of a large number of birds breeding in the area during the summer season. During this time, the SPA provides feeding grounds for thousands of northern gannets, black-legged kittiwakes, Atlantic puffins and the largest concentration of common terns in Scotland.

The SPA is also an important refuge for birds which have migrated thousands of miles from their breeding grounds in northern Europe and western Siberia to spend the winter in the area. During this time of the year, the site supports more than 35% of the common eider and over 23% of the velvet scoter British wintering populations, along with the largest Scottish concentrations of little gull. Data collected on visual aerial surveys over three winter seasons (2001/2002, 2003/2004, and 2004/2005) demonstrate that the Outer Firth of Forth and St Andrews Bay Complex SPA supports the largest concentration of red-throated diver and common eider, and the second largest concentrations of common scoter and red-breasted merganser in Scotland. The data show that these species, together with long-tailed duck and little gull, qualify for protection.

The overarching conservation objectives for the protected features of this site are to ensure they either remain in or reach favourable condition. European shag, black-legged kittiwake, common tern and

herring gull are considered to be in an unfavourable condition at the Outer Firth of Forth and St Andrews Bay Complex SPA and therefore an overarching 'restore' objective is set for the Site.

3.1.2.2 The Firth of Tay and Eden Estuary SPA and Ramsar

The Firth of Tay and Eden Estuary SPA and Ramsar is a complex of estuarine and coastal habitats stretching from the mouth of the River Earn in the inner Firth of Tay, east to Barry Sands on the Angus coast and St Andrews on the Fife coast. For much of its length the main channel of the estuary lies close to the southern shore and the most extensive intertidal flats are on the north side, west of Dundee. In Monifieth Bay, to the east of Dundee, the substrate becomes sandier and there are also mussel beds. The south shore consists of fairly steeply-shelving mud and shingle. The Inner Tay Estuary is particularly noted for the continuous dense stands of common reed along its northern shore. These reedbeds, inundated during high tides, are amongst the largest in Britain. Eastwards, as conditions become more saline, there are areas of saltmarsh, a relatively scarce habitat in eastern Scotland. The boundary of the SPA is contained within the following Sites of Special Scientific Interest: Inner Tay Estuary, Monifieth Bay, Barry Links, Tayport -Tentsmuir Coast and Eden Estuary.

The conservation objectives aim to avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site;
- Distribution of the species within site;
- Distribution and extent of habitats supporting the species;
- Structure, function and supporting processes of habitats supporting the species; and
- No significant disturbance of the species.

3.1.3 Potential Effects of the Proposed Development on Birds

Potential Impacts on birds from this Proposed Development are:

- Water quality affecting prey availability due to fines released from concrete during hydro-demolition.
- Water quality affecting prey availability due to contaminants from waterproofing and machinery (run-off and accidental spillage).
- Water quality due to air borne dust produced by various activities.
- Disturbance – disturbance (noise and visual) to breeding and non-breeding birds. Sources of disturbance are likely to include noise, lighting, presence of people and plant / machinery.

For details on the impacts of changes to water quality see **Section 3.1.1**.

The dynamic tidal flow of the Tay attracts a wide range of birds, both local and from further afield. The Tay Estuary is a key spot for wintering or migrating birds in the spring, autumn and winter. Due to the timing of the Proposed Development it is not likely to have a significant effect on wintering birds. The majority of overwintering species are not present May to July inclusive with numbers rising to a peak in mid-winter (SNH guidance, 2019). Therefore, although it is low risk there will be species using the Site before/after the summer period. The International Sites have designated breeding birds, the window for which is approximately between March and August inclusive, therefore construction for the Proposed Development will take place during breeding season.

The Proposed Development is outside the boundary of both SPAs; however, a check has been undertaken to determine the potential presence of wintering or migratory species with the potential to utilise the habitats present around the bridge and adjacent areas (within 500 m) and to forage in the area. Birds on the list for both SPAs have been observed feeding within 500 m of the bridge³, and there are birds on both lists that have large foraging ranges. The Herring Gull, which is in unfavourable condition, has been observed close to the bridge and other species which have the potential to forage in this area are also in unfavourable condition. Other British Trust for Ornithology (BTO) data consulted was over ten years old, however, due to the surrounding environment this is not a busy foraging area, although this cannot be ruled out. Indirect impacts due to changes to water quality from concrete fines, airborne dust or waterproofing and machinery cannot be ruled out at this stage for any of the designated bird species that forage in this area. The latter is much less likely as this work will be undertaken on the top deck but is still considered a risk albeit low.

Although there are sandbanks and beaches within 500 m that may be used by birds listed under the Site protection, it should be noted that the Proposed Development is currently a busy road that is very noisy (cars driving over deteriorated joints), produces a lot of light and therefore subject to high levels of background disturbance. The construction work for this development will generate a low continuous noise which birds will become habituated to rather than sudden loud noises. It should also be noted that the very busy side of the bridge beside the city is 9.75 m above sea-level and 38.1 m above sea-level in Fife, consequently less likely to disturb birds in the water. Therefore, it is unlikely that potential significant disturbance effects, due to construction. In addition, the level of noise will be reduced or remain the same as it is now with the introduction of the counterflow system.

Table 3-3 Results of Assessment for LSE on Birds

DESIGNATED SITE	QUALIFYING FEATURE	POTENTIAL EFFECT	LSE RESULT
The Outer Firth of Forth and St Andrews Bay Complex SPA	The Site supports an internationally important assemblage of wintering waterfowl including internationally important populations of several species. Fourteen species of bird breed in nationally important numbers.	Changes in water quality	Yes. There is a pathway and although impacts are unlikely there is a risk.
		Disturbance	Although a pathway was identified it is considered highly unlikely the Proposed Development will have an effect on bird behaviour.
The Firth of Tay and Eden Estuary SPA and Ramsar	The Site supports an internationally important assemblage of wintering waterfowl including internationally important populations of several species of breeding birds.	Changes in water quality	Yes. There is a pathway and although impacts are unlikely there is a risk.
		Disturbance	Although a pathway was identified it is considered highly unlikely the Proposed Development will have an effect on bird behaviour.

³ Bto.org. (2022). BirdTrack BTO/RSPB/BWI/SOC/WOS. [online] Available at: https://app.bto.org/birdtrack/explore/graph/graph_peak_count.jsp [Accessed 2 Jun. 2022].

3.1.4 Habitats

The inner parts of the estuaries are largely sheltered from wave action, while outer areas, particularly of the Tay, are exposed to strong tidal streams, giving rise to a complex pattern of erosion and deposition of the sandbank feature at the firths' mouth. The sediments within the site support biotopes that reflect the gradients of exposure and salinity and are typical of estuaries on the east coast of the UK.

3.1.4.1 The Firth of Tay and Eden Estuary SAC

The Firth of Tay and Eden Estuary SAC are situated on the east coast of Scotland between Carnoustie in the north and St Andrews in the south. The site has been designated as a SAC on the basis that the area contains representative estuaries in south-east Scotland. Most of the permanent channels of the estuaries (7596 ha) are considered to be examples of the habitat 'sandbanks which are slightly covered by seawater all the time', whilst much of the intertidal areas (6700 ha) are considered as 'mudflats and sandflats not covered by seawater at low tide'.

The biotopes found within these broad habitat types are of low species diversity, as might be expected for such estuarine environments. Bates et al (2004) reports that the Firth of Tay is 'characterised by powerful tidal currents and a high suspended sediment load' by the subtidal sandbanks and intertidal flats is composed of common biotopes.

3.1.4.2 Potential Effects of the Proposed Development on Habitats

Potential Impacts on habitats from this Proposed Development are:

- Water quality affecting habitats due to fines released from concrete during hydro-demolition.
- Water quality affecting habitats due to contaminants from waterproofing and machinery (run-off and accidental spillage).
- Water quality due to air borne dust produced by various activities.

The Proposed Development will be hydrologically linked to designated benthic habitats within The Firth of Tay and Eden Estuary SAC and Ramsar site. The habitats designated are at least 1 km away and due to the scale of works and the distance between the Proposed Development on land and the International Sites situated in the water means that it is very unlikely that pollutants from the Proposed Development will result in any discernible effects on QI habitat. In addition, if small amounts did reach the water effects would be *de minimus* due to volume of water causing dilution, tidal mixing, the works are temporary, there will be no in stream works, low sensitivity (already high silt loading), and the works are extremely localised.

However, the risk of concrete fines entering the system (from the underside of the bridge deck) during construction or surface water run-off or accidental spillage from the waterproofing/machinery must be considered. Without adequate mitigation measures these effects could be significant and possibly extensive and of medium-term duration due to contamination of benthic sediments.

Table 3-4 - Results of Assessment for LSE on Habitats

DESIGNATED SITE	QUALIFYING FEATURE	POTENTIAL EFFECT	LSE RESULT
The Firth of Tay and Eden Estuary SAC and Ramsar	Estuarine habitats	Indirect impacts due to changes in water quality.	Yes. There is a pathway and although impacts are unlikely there is a risk.

4 IN-COMBINATION

It is assumed for the purpose of the assessment of in-combination effects that all avoidance, reduction and mitigation measures and best practice control measures identified for the plans and projects indicated would be fully implemented. However, there may be a risk of residual effects from individual projects on the Firth of Tay which, taken alone, would not be significant in terms of the integrity of the International Site but which, if taken in-combination, would be significant.

Plans and projects within 2 km of the Proposed Development and submitted within the last five years⁴ were searched for on the Dundee City Council and Fife Council planning portal, as well as the Inner Tay Masterplan and the Perth and Kinross Local Development Plan. The plans and projects listed in **Table 4-1** are considered in conjunction with the Proposed Development.

Table 4-1 – Plans and Projects within 2km from the Proposed Development

REFERENCE NUMBER	DESCRIPTION OF DEVELOPMENT	LOCATION (DISTANCE)
18/00562/PPPL	Erection of 12 flats and one shop unit.	Land to the North Of 222 Hilltown Dundee. 1.2 km from Proposed Development at Dundee City side of the bridge.
18/00290/FULM	Erection of 41 houses and 16 flats (57 units in total) along with associated roads, footpaths, parking spaces, gardens and hard and soft landscaped areas.	Maxwelltown Works Alexander Street Dundee. 1 km from Proposed Development at Dundee City side of the bridge.
17/00803/PAN	To develop a mix of 60 affordable housing and flats with associated parking, cycle storage, refuse storage and greenspace.	Alexander Street Dundee. 1 km from Proposed Development at Dundee City side of the bridge.

All the plans/projects listed in **Table 4-1** are housing developments that occur inland within the City of Dundee and at least 1 km from the Proposed Development. It is therefore considered unlikely these developments would have a risk of polluted or silt-laden runoff, and therefore it is considered highly unlikely that if the construction periods were the same time there would be in-combination effects on the Firth of Tay.

⁴ Only medium-large scale projects were searched for as modifications to dwelling houses and other small-scale projects are unlikely to have a zone of influence outwith the landholding.

5 CONCLUSIONS

Following an examination, analysis and evaluation of the relevant information it is the professional opinion of the authors of this report that the Proposed Development alone has the potential to lead to LSE on the designated features of:

- The Firth of Tay and Eden Estuary SAC;
- The Firth of Tay and Eden Estuary SPA; and
- The Outer Forth and St Andrews Bay Complex SPA.

As potential LSE have been identified during this Stage 1: Screening process, a Stage 2: Appropriate Assessment will be required at the detailed design stage.

6 REFERENCES

- Bto.org. (2022). BirdTrack BTO/RSPB/BWI/SOC/WOS. [online] Available at: https://app.bto.org/birdtrack/explore/graph/graph_peak_count.jsp [Accessed 2 Jun. 2022].
- David Tyldesley and Associates (2015). Habitats Regulations Appraisal of Plans: Guidance for Plan-making Bodies in Scotland. Version 3.0. January 2015
- Dundee.gov.uk. (2022). Simple Search. [online] Available at: <https://idoxwam.dundee.gov.uk/idoxpa-web/> [Accessed 9 Jun. 2022].
- European Commission (2000a). Managing Natura 2000 Sites, the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC
- European Commission (2000b). Communication from the Commission on the Precautionary Principle.
- European Commission (2018). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC
- Habitats Regulations Appraisal (HRA) on the Firth of Forth 2019. A Guide for developers and regulators
- Hanson, N., Thompson, D., Duck, C., Baxter, J., and Lonergan, M. (2017) Harbour seal (*Phoca vitulina*) abundance within the Firth of Tay and Eden Estuary, Scotland: recent trends and extrapolation to extinction. *Aquatic Conserv: Mar. Freshw. Ecosyst.*, 27: 268– 281. doi: [10.1002/aqc.2609](https://doi.org/10.1002/aqc.2609). highly mobile mammal *Journal of Applied Ecology* 2013, 50, 499-509.
- Holman (2014). Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management.
- Natural England (2018). Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Available: <http://publications.naturalengland.org.uk/publication/4720542048845824>
- NatureScot (2016). Assessing connectivity with special protection areas (SPAs) – Guidance – Version 3.
- NatureScot (2018). Guidance Note. The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement.
- Nicola Quick , Monica Arso , Barbara Cheney , Valentina Islas , Vincent Janik , Paul M. Thompson and Philip S. Hammond The east coast of Scotland bottlenose dolphin population: Improving understanding of ecology outside the Moray Firth SAC, 2014
- Npi.gov.au. (2019). *Methyl methacrylate | National Pollutant Inventory*. [online] Available at: <http://www.npi.gov.au/resource/methyl-methacrylate>.
- Paterson, WD, Russell, DJF, Wu, G-M, et al. Post-disturbance haulout behaviour of harbour seals. *Aquatic Conserv: Mar Freshw Ecosyst.* 2019; 29 (S1): 144– 156. <https://doi.org/10.1002/aqc.3092>
- Perth and Kinross Local Development Plan 2. (2019). [online] Available at: https://www.pkc.gov.uk/media/45242/Adopted-Local-Development-Plan-2019/pdf/LDP_2_2019_Adopted_Interactive.pdf?m=637122639435770000 [Accessed 16 Apr. 2022].
- Preserving The Past Promoting The Future. (n.d.). [online] Available at: <https://www.taysalmon.co.uk/library/docs/inner-tay-masterplan.pdf> [Accessed 9 Jun. 2022].
- Russell, D. J. F., McConnell, B., Thompson, D., Duck, C., Morris, C., and Harwood, P. and Jason Mathiopoulos – Uncovering the links between foraging and breeding regions in a
- Scottish Fisheries Coordination Centre (2007). Habitat Survey Training Manual. Available: <https://www.sfcc.co.uk/assets/files/SFCC%20Habitat%20Training%20Manual.pdf>
- Scottish Government (2014). Scottish Planning Policy.
- SEPA (2019). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) – A Practical Guide. Version 8.3.
- Sharples, R. J., Moss, S. E., Patterson, T. A., & Hammond, P. S. (2012). Spatial variation in foraging behaviour of a marine top predator (*Phoca vitulina*) determined by a large-scale satellite tagging program. *PloS one*, 7(5), e37216. <https://doi.org/10.1371/journal.pone.0037216>



The British Standards Institution (2012). Trees in relation to design, demolition and construction – recommendations.

Tyldesley, D. and Chapman, C. (2013) The Habitats Regulations Assessment Handbook (July 2020 Edition) UK DTA Publications Ltd.



Appendix A

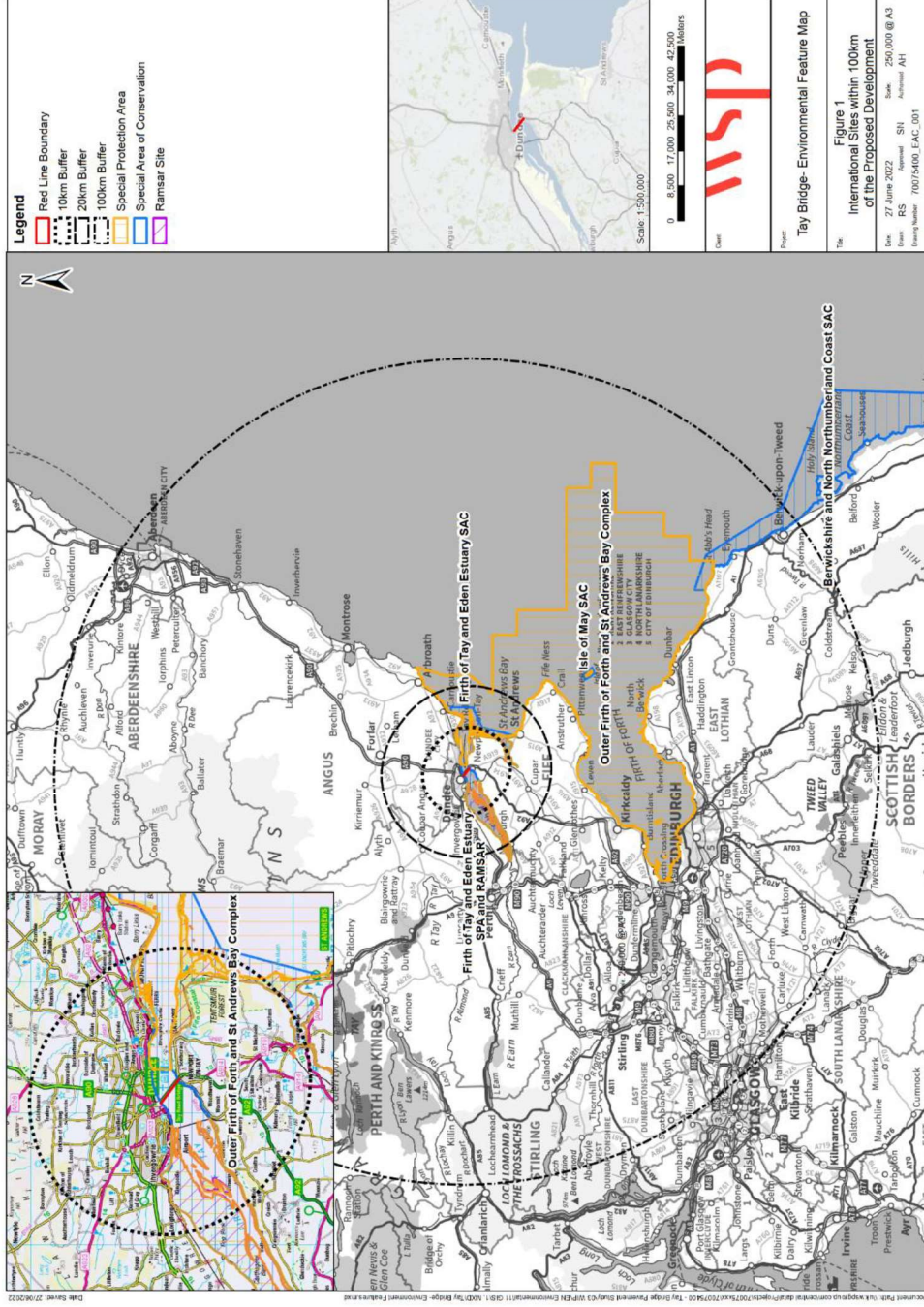


Figure 1 - International Sites within 100 km of the Proposed Development



Figure 2 - The Tay Road Bridge (view looking South from Dundee)

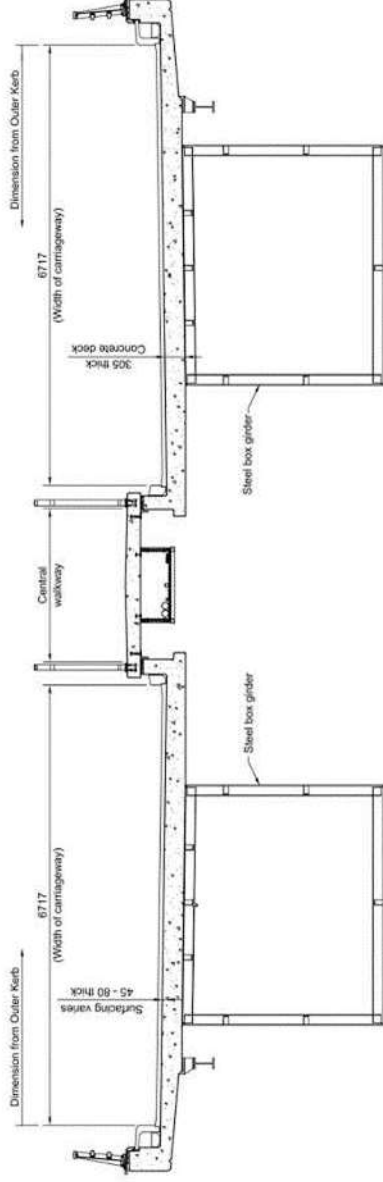


Figure 3 - Tay Road Bridge Typical Cross Section (the surfacing varies but will be approximately 45 – 120 m thick and the spans vary between 24.4 m and 76.2 m).



Figure 4 - Existing surfacing planing and scraping of remaining surfacing



Figure 5 - Scabbling of Concrete Deck and Captive Shot Blasting



Figure 6 – Spray-applied waterproofing and conventional paving



Figure 7 - Typical joint installation after new surfacing cut out over gap



Figure 8 - Hydro-demolition, Sprayed Concrete Repair

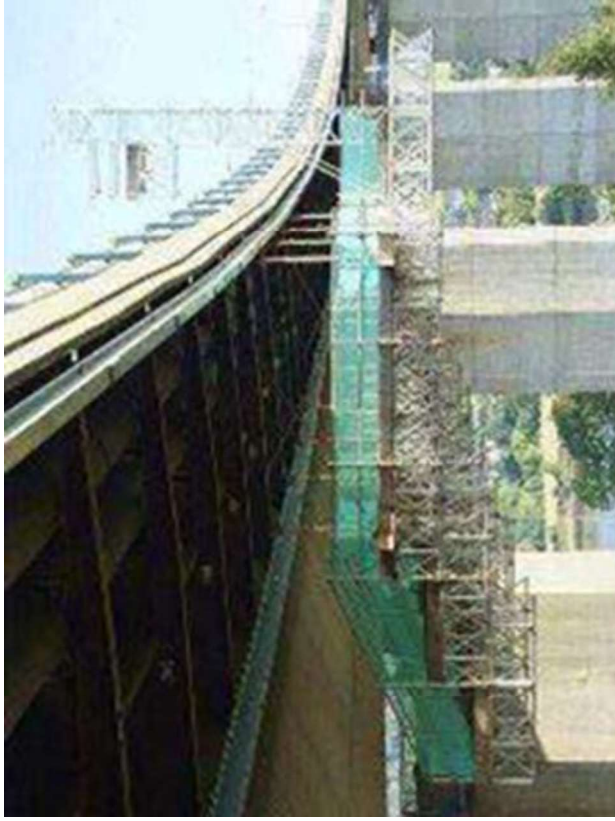


Figure 9 - Scaffolding and Debris Netting

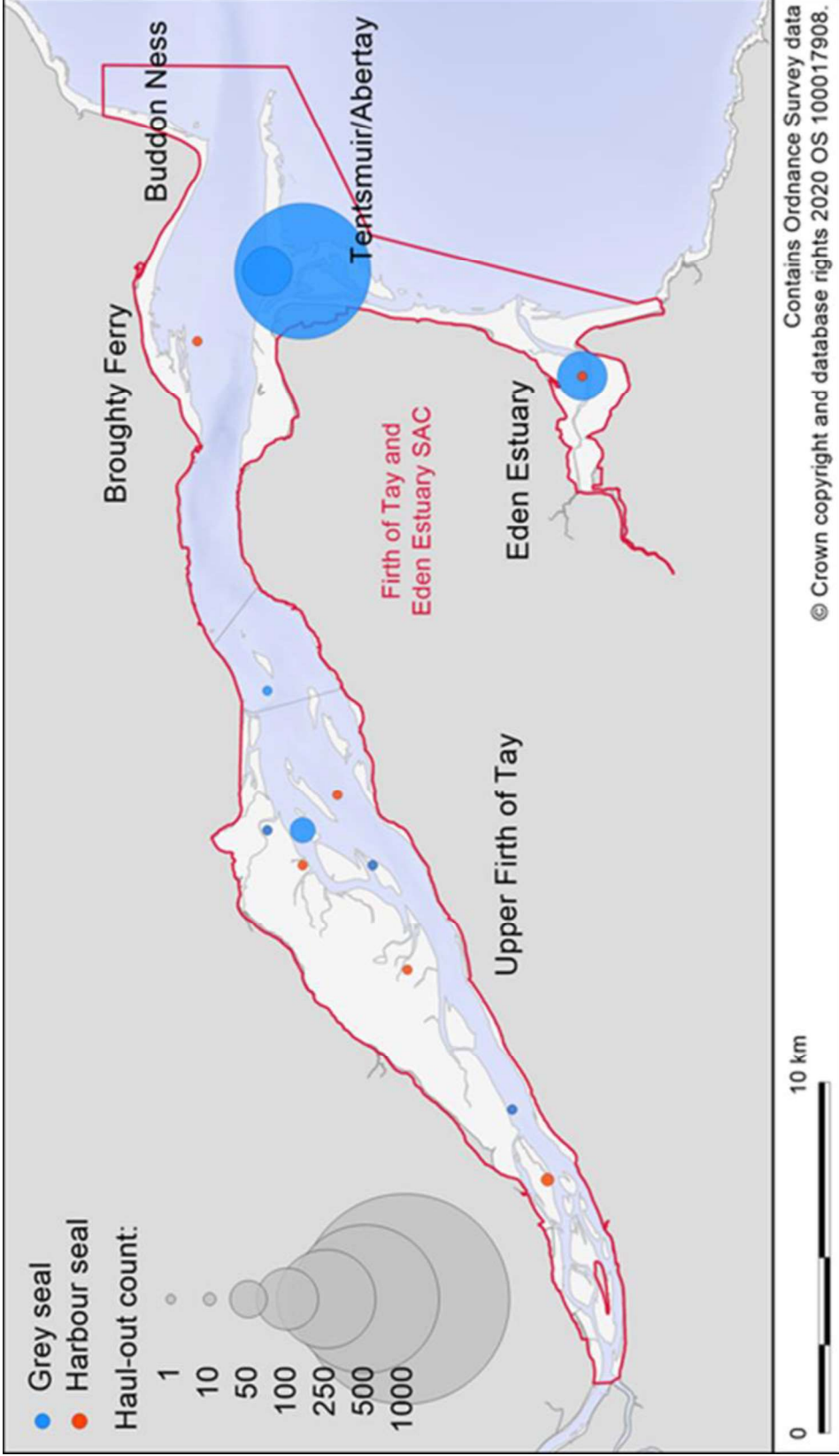


Figure 10 Harbour seal and Grey seal haul-out sites near the Proposed Development



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