Christchurch Bay & Harbour FCERM Strategy

Defence Condition Report

Bournemouth, Christchurch and Poole (BCP) Council, New Forest District Council (NFDC) and the Environment Agency

Project number: 60656006

April 2024

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Quality information

Prepared by	Checked by	Verified by	Approved by
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
00	24/09/21	Draft for comment	JCAS	Jon Short	Associate
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02	13/12/21	Final update following client comments	JCAS	Jon Short	Associate
03	18/05/22	Update to maps	BT	Ben Taylor	Senior Consultant
04	30/04/24	Minor updates to formatting	BT	Ben Taylor	Principal Consultant

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1. Introduction

1.1 Overview

AECOM has been commissioned by Bournemouth, Christchurch and Poole (BCP) Council, working in partnership with New Forest District Council (NFDC) and the Environment Agency (EA), to develop a Flood and Coastal Erosion Risk Management (FCERM) Strategy for the coastal frontage at Christchurch Bay & Harbour (herein referred to as 'the Strategy'). The Strategy extent is the coastal frontage between Hengistbury Head (immediately to the east of Hengistbury Head long groyne) and the landward (western) end of Hurst Spit. Within Christchurch Harbour, the Strategy extent is to Tuckton Bridge on the River Stour and to Knapp Mill on the River Avon (see Figure 1-1).

Figure 1-1: Map of Strategy area

The aim of the Strategy is to provide an integrated plan for the Christchurch Bay & Harbour frontage, delivering sustainable and long-term management for coastal flood and erosion risks over the next 100 years. The Strategy will further develop the existing Poole & Christchurch Bay SMP2 policies adopted in 2011 and update the information provided in the 2012 Christchurch Bay & Harbour FCERM Study using the most up-to-date data and guidance. The Strategy is being developed collaboratively by AECOM, and the Project Board consisting of officers of BCP Council, New Forest District Council (NFDC) and the Environment Agency (EA).

1.2 This Report

This report provides a summary of the condition of the existing defences within the Strategy area. The information presented in this report is based on defence condition data provided by NFDC, BCP Council and the Environment Agency at the start of the project (2021). No asset inspection has been undertaken by AECOM to support the production of this report.

This report defines the types and condition of the different defences along the Strategy area, which forms an important part of the baseline information required to develop the Strategy. The findings of the defence condition assessment can also be used to identify potential areas for priority works in the shorter term.

2. Defence Condition Methodology

2.1 Datasets

This section provides a summary of the datasets used to develop this report, including those from BCP Council, NFDC and the Environment Agency. Each of the datasets includes a defence condition assessment grade, which was determined using the Environment Agency (2012) T98 Condition Assessment Manual. Although the defences are located within BCP Council and NFDC areas, not all of these defences are owned or maintained by the local authority. Figure 2-1 to Figure 2-4 show the defences by maintainer.

2.1.1 NFDC Assets

A survey of the defence structures maintained by NFDC, between Naish Farm (Barton-on-Sea) and the western end of Hurst Spit, was undertaken in October 2021 by NFDC. This survey superseded the previous survey carried out in April 2021, and assessed the condition of all NFDC assets, including beaches, groynes, seawalls and revetments. The survey commenced at Barton-on-Sea and progressed eastwards, recording the details of the structures in sequence.

NFDC provided AECOM with the dataset in the form of a GIS shapefile, which includes all defence structures within the area. This dataset includes information such as defence type, the condition grade and residual life estimates determined from this survey.

2.1.2 BCP Council Assets

BCP Council and the Environment Agency provided data to AECOM for the BCP part of the Strategy frontage. The data included the defence structures within Christchurch Bay (west of Chewton Bunny) and in Christchurch Harbour.

BCP Council Data
BCP Council provided a GIS shapefile which includes all the BCP assets in the Strategy area with information relating to the defence type. The last inspection for the Christchurch Bay assets is stated as 30th March 2020, and 12th April 2019 for the Christchurch Harbour assets (with some of the main assets inspected in July 2021).

Environment Agency AIMS Data
The Environment Agency provided a GIS shapefile and spreadsheet, which contains information relating to the defence structures within Christchurch Harbour. This dataset includes condition grades and has been used to supplement the data provided by BCP Council where there were no condition grades or residual life estimates. For the Environment Agency maintained assets, the date of the last inspection is stated as 8th November 2020. The date of the last inspection for privately maintained defence assets ranges between 13th July 2017 and 8th November 2020.

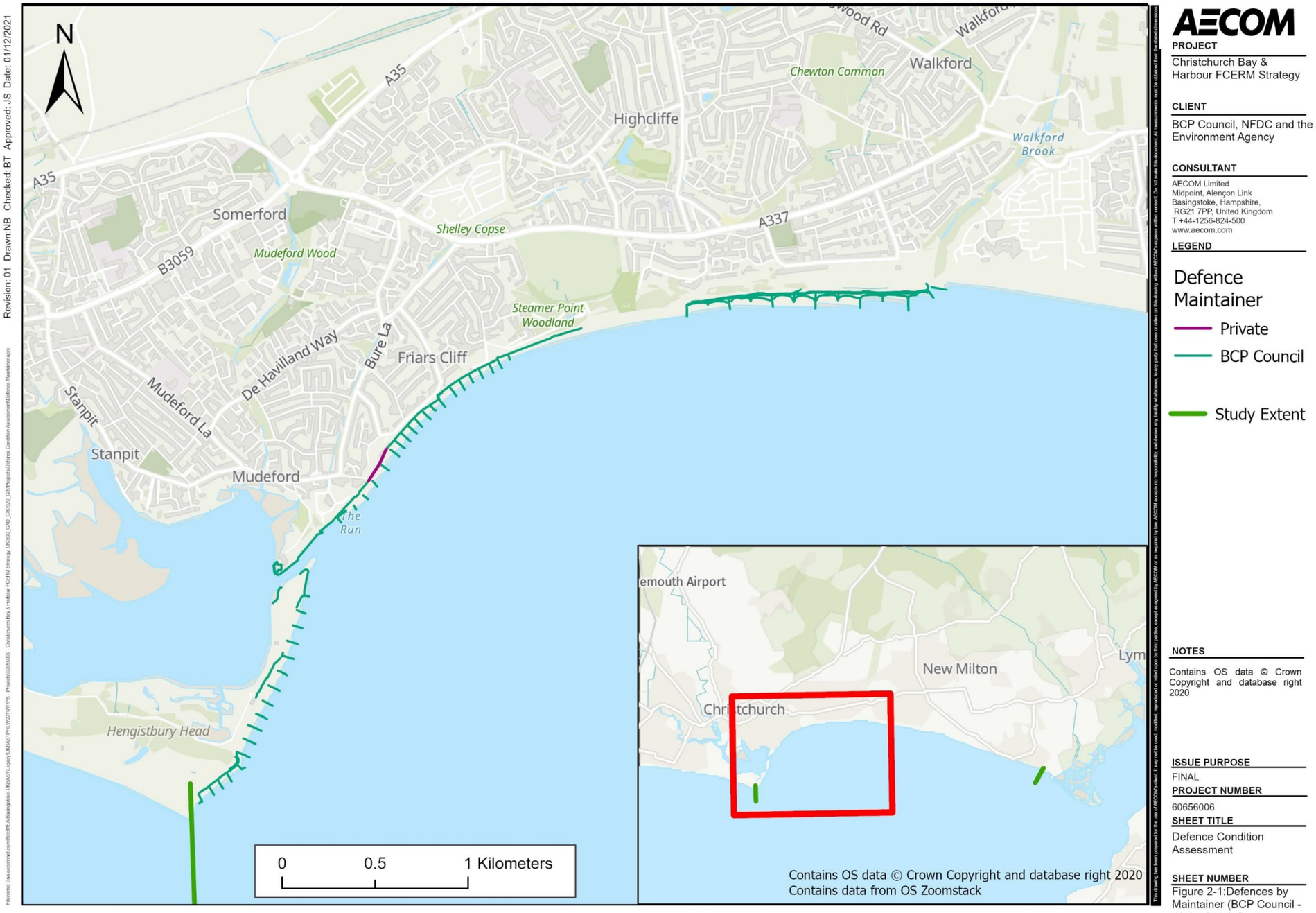

Figure 2-1: Defences by Maintainer (BCP Council - Christchurch Bay)

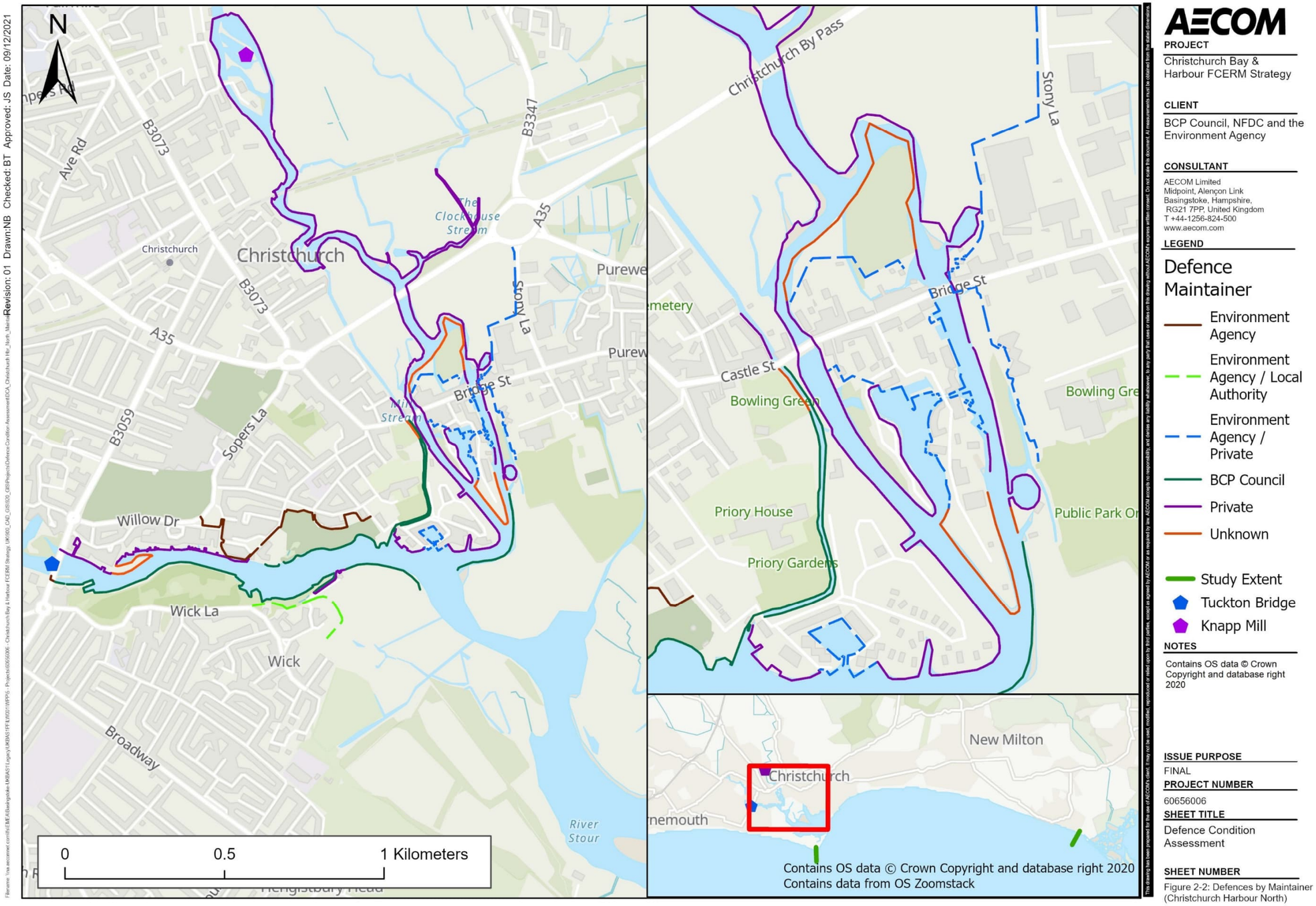

Figure 2-2: Defences by Maintainer (BCP Council - Christchurch Harbour North)

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Christchurch Bay & Harbour FCERM Strategy

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LEGEND

Defence Maintainer
- Private

Study Extent
- Tuckton Bridge
- Knapp Mill

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ISSUE PURPOSE
FINAL

PROJECT NUMBER
60656006

SHEET TITLE
Defence Condition Assessment

SHEET NUMBER
Figure 2-3: Defences by Maintainer (Christchurch Harbour South)

Figure 2-3: Defences by Maintainer (BCP Council - Christchurch Harbour South)

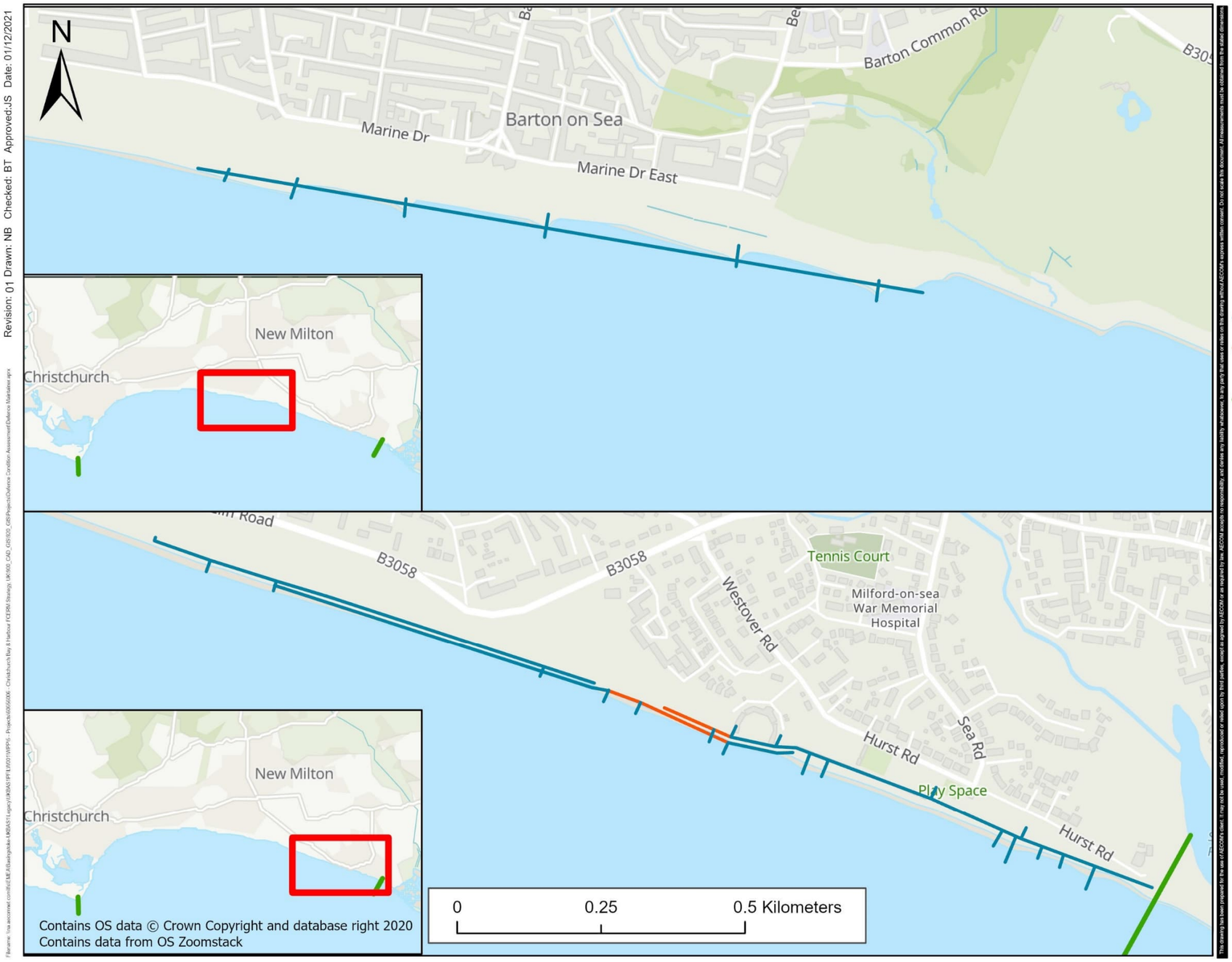

Figure 2-4: Defences by Maintainer (NFDC)

2.2 Condition Rankings and Residual Life

In the various datasets provided by BCP Council, NFDC and the Environment Agency the condition of the defences was assessed in line with the Environment Agency Condition Assessment Manual guidance (2006 & 2012) with condition scores between 1-5 assigned to each defence type.

Table 2-1 below has been adapted from the latest Environment Agency Condition Assessment Manual (2012). It shows the various condition grades and the corresponding residual life estimates for defence assets. In the datasets provided by BCP Council, residual life estimates of the assets were not included. Therefore, AECOM has needed to estimate the residual life of the defences using Table 2-1 and the condition grade as a benchmark.

It should be noted that the relationship between condition grade and residual life presented in Table 2-1 is an approximation and local variations in defence condition and residual life may exist. There may also be variations in the relationship between condition grade and residual life with different defence types. Having not undertaken a visual inspection of the defences, AECOM has not considered these complexities in the production of this report. The level of detail provided in the BCP and NFDC datasets and the approach taken is considered to be robust within the context of Strategy development, but more detailed inspections may be warranted for local level studies, designs or investigations.

Table 2-1: Summary of Condition Assessment grading and features (adapted from Environment Agency Condition Assessment Manual, 2012)

Grade	Definition	Possible features/characteristics	Typical residual life (without maintenance)
Very Good (1)	Cosmetic defects that will have no effect on performance	• new or recently maintained defence • structurally sound • no rotation or bulging • no deterioration to fixings / abrasion • no wash-out or movement or downsliding • stable structure – no movement of stones • vegetation to help bind (where beneficial) • hairline cracks • joints fully sealed	>20 years
Good (2)	Minor defects that will not reduce overall performance of the asset.	• minor cosmetic defects not hindering performance • fixings present • superficial rusting • slight gaps in joints • minor abrasion • minor toe scour / erosion • no animal burrowing or foreign objects present • minor sliding • minor sealant loss	15 – 20 years
Fair (3)	Defects that could reduce performance of the asset.	• some defects and degradation cracking, spalling, rusting etc. • significant gaps in joints • signs of rotting • minor misalignment / rotation or bulging • minor settlement • minor foreign objects • small animals burrowing • minor reduction to thickness of structure • sealant loss	10 – 15 years

Grade	Definition	Possible features/characteristics	Typical residual life (without maintenance)
Poor (4)	Defects that would significantly reduce performance of the asset. Further investigation needed.	• structural defects • significant cracking and deterioration / rusting • significant undermining/toe scour • missing fixings • rotation or lateral movement inwards • animal burrows • foreign objects • drainage failed • ground saturated behind	<10 years
Very Poor (5)	Severe defects resulting in complete performance failure.	• significant / severe damage and deterioration • severe cracking / deterioration • loss or partial loss of structure • severe erosion / undermining • severe settlement of crest / behind • severe abrasion • complete or partial collapse • severe backfill washout	Failed

3. Defence Condition

3.1 Defence Condition Tables

The following defence condition summary tables (Table 3-1 and Table 3-2) provide an overview of the defences within the BCP Council and NFDC areas respectively. This includes an indication of the defence type, condition grading and an estimate of residual life (without maintenance) for each section of defence. The assessment evaluates the defences from west to east; from Hengistbury Head (immediately to the east of Hengistbury Head long groyne) to the landward (western) end of Hurst Spit, with each defence identified with approximate coordinates. The extents of these defences are displayed in Figure 3-1 to Figure 3-5. These figures show the different defence types, with reference to the Frontage IDs. Where different parts of the defence structures are in different conditions, the range of grades / residual life are presented within the table.

Note that beaches have not been included in the defence condition tables given that the condition of beaches is highly variable over time and subject to environmental conditions (i.e. frequency of storms).

However, many of the defences rely on the beach material along the open coast of the Strategy frontage. A good example of this is at Milford on Sea where the groynes and parts of the concrete seawall which are not protected by a rock revetment are reliant on the beach. The beach here is the primary defence, of which NFDC invests a significant proportion of its maintenance budget. This includes groyne maintenance and beach replenishment. As the beach condition is subject to environmental conditions, there has been a long term decline in beach levels resulting in localised defence failures. Please refer to the Coastal Processes report for analysis on beach levels across the frontage.

Note that there is a section of failed concrete seawall, located between Frontage 3C and 3F (now fronted by a newly installed section of revetment). The failed concrete wall is not included within Table 3-2, but is shown in Figure 3-5.

Table 3-1: BCP Defence Condition Summary

Frontage ID	Centre X	Centre Y	Summary of Defence Type	Section Length (m)	Maintainer	Defence Grade	Residual Life	Notes
1A	418000	90500	Rock armour	320	Local Authority	4	<10 years	
1B	418050	90550	Gabions	100	Local Authority	4	<10 years	
1C	418000	90450	Groynes – rock (x4) (HH1 to HH4)	270	Local Authority	3	10 – 15 years	
1D	418300	91000	Groynes – rock (x13) (S1 to S13)	930	Local Authority	2	15 – 20 years	
1E	418230	91020	Seawall	280	Local Authority	3	10 – 15 years	
1F	418420	41500	Rock armour	200	Local Authority	3	10 – 15 years	
1G	418400	91670	Seawall – sheet pile	330	Local Authority	3	10 – 15 years	
1H	418650	91950	Seawall – concrete	370	Local Authority	3	10 – 15 years	
1I	418620	91900	Rock armour	60	Local Authority	4	<10 years	
1J	418750	92000	Groyne – rock (x2) (M1 to M2)	60	Local Authority	4	<10 years	Some derelict condition or buried
1K	418660	91920	Groyne – rock (x3) (M3 to M5)	320	Local Authority	3	10 – 15 years	
-	418830	92170	Concrete walls	560	Private	-	-	Non-FCERM assets / Car park walls. Provides protection to footpath
1L	419010	92350	Groynes – timber & rock (x3) (M7 to M9)	160	Local Authority	4	<10 years	Some mostly buried – rock elements added at a different time
1M	419100	92600	Groynes – timber & rock (x4) (M10 to M13)	160	Local Authority	3	10 – 15 years	
1N	419030	92430	Seawall – concrete	400	Local Authority	2	15 – 20 years	Promenade wall
1O	419250	92570	Groynes – timber & rock (x7) (F1 to F7)	200	Local Authority	3	10 – 15 years	
1P	419300	92660	Seawall – concrete	340	Local Authority	3	10 – 15 years	
1Q	419600	92800	Seawall – concrete	300	Local Authority	3	10 – 15 years	
1R	419830	92870	Rock revetment	170	Local Authority	3	10 – 15 years	
1S	421150	93100	Rock armour toe	1,300	Local Authority	-	-	Cliff toe protection
1T	421150	93070	Rock armour revetment	1,300	Local Authority	2	15 – 20 years	Partially buried

Frontage ID	Centre X	Centre Y	Summary of Defence Type	Section Length (m)	Maintainer	Defence Grade	Residual Life	Notes
1U	421150	93040	Groyne – Rock (x13) (H0 to H12)	1,300	Local Authority	2	15 – 20 years	(1 groyne marked as grade 4, but majority a mix of 2 and 3)
1V	418300	91600	Flood Gates	25	Local Authority	2/3/4	0 – 20 years	Mudeford Quay Flood Gates
1W	421150	93070	Slope Stabilisation Scheme	1,300	Local Authority	-	-	Counterforte Drainage system
-	416610	91350	Seawall – concrete	70	Private	-	-	Non-FCERM asset / Hengistbury Head Outdoor Centre
2A	415670	92180	Natural Verge	1,300	Environment Agency / Local Authority / Private	3	10 – 15 years	Defence Grade: AIMS
2B	415030	92200	Sheet Pile	700	Local Authority	3	10 – 15 years	Defence Grade: AIMS
2C	415000	92230	Sheet Pile	220	Private	3	10 – 15 years	Defence Grade: AIMS
2D	415600	92250	Natural Verge	270	Unknown	3	10 – 15 years	Defence Grade: AIMS
2E	415180	92280	Rock Armour	50	Local Authority	3	10 – 15 years	
2F	415850	92400	Masonry Wall	450	Local Authority	3/4	Approx. 10 years	
2G	416130	92340	Masonry Wall	880	Environment Agency	2	15 – 20 years	Defence Grade: AIMS Quomps emergency works in November 2021 due to wall failure.
2H	416250	92330	Masonry Wall	860	Local Authority / Unknown	3/4	Approx. 10 years	Defence Grade: AIMS
2I	416220	92500	Gabions	70	Private	3	10 – 15 years	Defence Grade: AIMS
2J	41620	92500	Unknown	180	Private	-	-	No defence grade as privately maintained defence
2K	41690	92670	Concrete Seawall	300	Environment Agency / Private	2	15 – 20 years	Defence Grade: AIMS
2L	415700	93380	Sheet Pile	260	Private	2	15 – 20 years	Defence Grade: AIMS
2M	416370	92570	Natural Verge	400	Private	3	10 – 15 years	Defence Grade: AIMS
2N	416300	92350	Masonry Wall	120	Private	3	10 – 15 years	Defence Grade: AIMS
2O	416150	92800	Natural Verge	5,600	Private	-	-	No defence grade as privately maintained defence
2P	416150	92800	Natural Verge	40	Unknown	2	15 – 20 years	Defence Grade: AIMS

Frontage ID	Centre X	Centre Y	Summary of Defence Type	Section Length (m)	Maintainer	Defence Grade	Residual Life	Notes
2Q	416250	92650	Sheet Pile	150	Private	2	15 – 20 years	Defence Grade: AIMS
2R	417400	92130	Natural Verge	700	Local Authority / Unknown	3	10 – 15 years	Defence Grade: AIMS
2S	417600	91900	Natural Verge	1,130	Environment Agency / Private	2	15 – 20 years	Defence Grade: AIMS
2T	417900	91900	Earth Embankment / Masonry Wall	300	Environment Agency / Private	2/3	10 – 20 years	Defence Grade: AIMS
2U	418370	91870	Masonry Wall	120	Private	2	15 – 20 years	
2V	415750	92160	Earth Embankment / Masonry Wall	850	Environment Agency / Private	-	-	No defence grade as privately maintained defence
2W	416150	92790	Natural Verge	50	Unknown	-	-	No defence grade as privately maintained defence
2X	416320	92790	Rock Armour / Concrete Seawall	1,460	Private	-	-	No defence grade as privately maintained defence
2Y	417440	92060	Concrete Seawall	300	Private	-	-	No defence grade as privately maintained defence
2Z	415660	92110	Concrete Seawall	400	Private	-	-	No defence grade as privately maintained defence

Table 3-2: NFDC Defence Condition Summary

Frontage ID	Centre X	Centre Y	Summary of Defence Type	Section Length (m)	Maintainer	Defence Grade	Residual Life	Notes
3A	424000	92810	Rock Revetment	1,830	Local Authority	2/3	10 – 15 years	These structures are vulnerable to ongoing ground movement.
3B	424000	92810	Rock Groyne (x6)	380	Local Authority	2/3/4	<10 years	
3C	428130	91610	Concrete Seawall	800	Local Authority	3	<10 years	The integrity of the section of the Seawall not protected by rock revetment is sensitive to the presence and supply of beach material which is subject to coastal conditions.
3D	428260	91560	Rock Revetment	630	Local Authority	3	10 – 15 years	
3E	428570	91460	Rock Revetment	60	Private Land (maintainer unknown)	1	20 years	Urgent works were undertaken at this site by NFDC during 2020, through its powers as Coastal Protection Authority.
3F	428700	91420	Concrete Seawall	130	Private Land (maintainer unknown)	4	<10 years	Urgent works were undertaken at this site by NFDC during 2020, through its powers as Coastal Protection Authority.
3G	428670	91420	Rock Revetment	170	Private Land (maintainer unknown)	1	20 years	Urgent works were undertaken at this site by NFDC during 2020, through its powers as Coastal Protection Authority.
3H	428790	91380	Concrete Seawall	80	Local Authority	2	<10 years	
3I	428820	91370	Rock Revetment	110	Local Authority	2	10 – 15 years	
3J	428970	91340	Concrete Seawall	300	Local Authority	2	<10 years	The integrity of the section of the Seawall not protected by rock revetment is sensitive to the presence and supply of beach material which is subject to coastal conditions.
3K	429180	91250	Concrete Seawall	170	Local Authority	2	<10 years	The integrity of the section of the Seawall not protected by rock revetment is sensitive to the presence and supply of beach material which is subject to coastal conditions.
3L	429370	91170	Concrete Seawall	240	Local Authority	2/3	<10 years	The integrity of the section of the Seawall not protected by rock revetment is sensitive to the presence and supply of beach material which is subject to coastal conditions.
3M	427910	91670	Timber Groynes (x2)	50	Local Authority	2/3	<10 years	Stability of the timber groynes is heavily reliant on the presence and supply of beach material which is subject to coastal conditions. Without regular ongoing maintenance these groynes are expected to fail in a short space of time.
3N	428590	91460	Timber Groynes (x8)	180	Local Authority	2/3/4	<10 years	Stability of the timber groynes is heavily reliant on the presence and supply of beach material which is subject to coastal conditions. Without regular ongoing maintenance these groynes are expected to fail in a short space of time.
3O	428890	91350	Rock Groyne (x1)	40	Local Authority	2	<10 years	

Frontage ID	Centre X	Centre Y	Summary of Defence Type	Section Length (m)	Maintainer	Defence Grade	Residual Life	Notes
3P	429060	91280	Timber Groynes (x10)	300	Local Authority	2	<10 years	Stability of the timber groynes is heavily reliant on the presence and supply of beach material which is subject to coastal conditions. Without regular ongoing maintenance these groynes are expected to fail in a short space of time.
3Q	429310	91190	Rock Groynes (x2)	80	Local Authority	3	<10 years	
3R	429310	91190	Timber Groynes (x2)	70	Local Authority	2/3/4	<10 years	Stability of the timber groynes is heavily reliant on the presence and supply of beach material which is subject to coastal conditions. Without regular ongoing maintenance these groynes are expected to fail in a short space of time.

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LEGEND

Defence Type

- Flood Gate
- Gabions
- Non-FCERM (Car Park Walls)
- Rock Groynes
- Rock Revetment
- Rock armour
- Concrete Seawall
- Seawall / Sheet pile
- Slope Stabilisation Scheme
- Study Extent

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Defence Condition Assessment

SHEET NUMBER
Figure 3-1: BCP Council Defences - Christchurch Bay (West)

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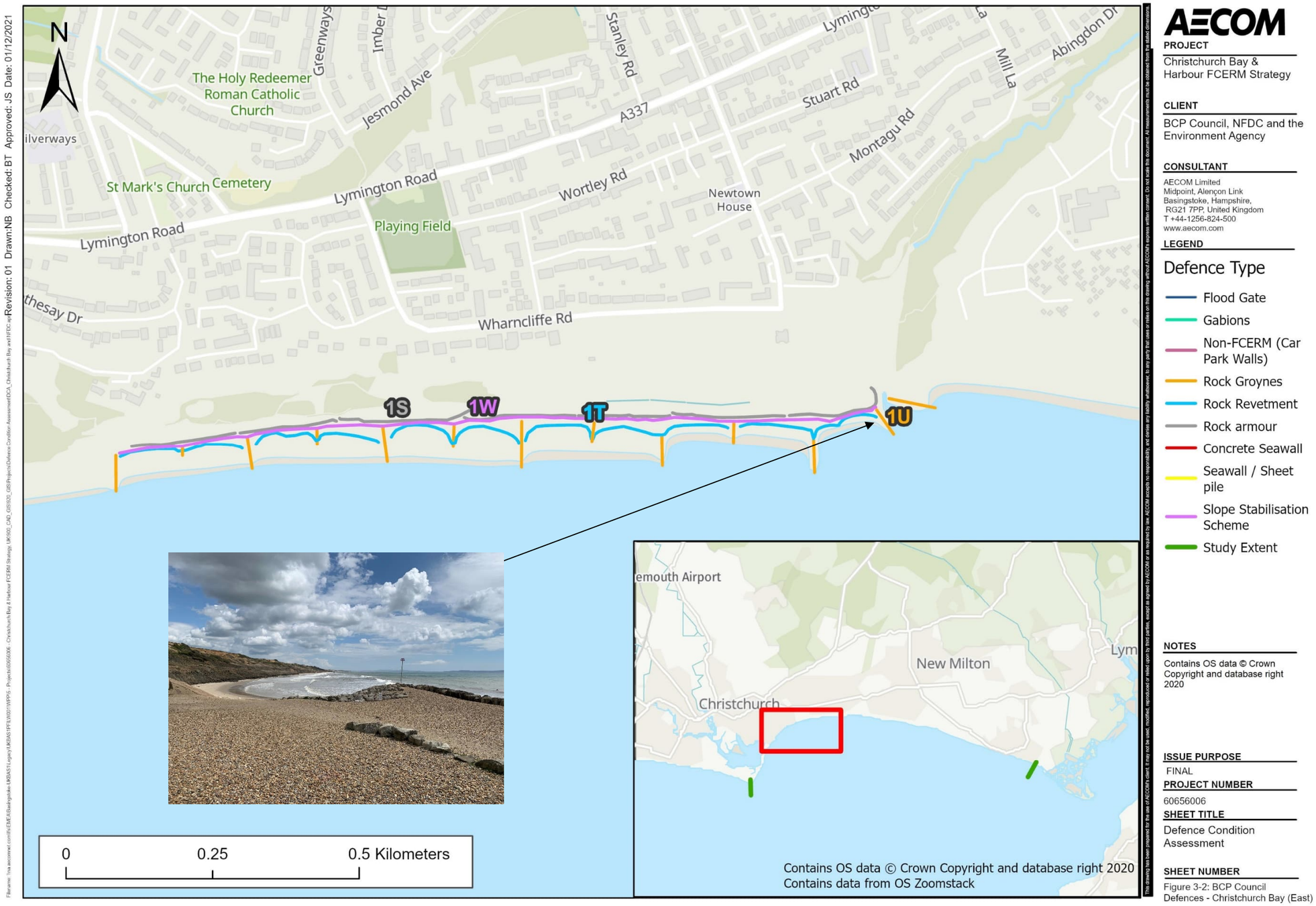
Figure 3-1: Defence Types in BCP Council area – Christchurch Bay (West) (Frontage ID 1A – 1W)



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LEGEND

Defence Type
- Flood Gate
- Gabions
- Non-FCERM (Car Park Walls)
- Rock Groynes
- Rock Revetment
- Rock armour
- Concrete Seawall
- Seawall / Sheet pile
- Slope Stabilisation Scheme
- Study Extent

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SHEET NUMBER
Figure 3-2: BCP Council Defences - Christchurch Bay (East)

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Figure 3-2: Defence Types in BCP Council area – Christchurch Bay (East) (Frontage ID 1S – 1W)

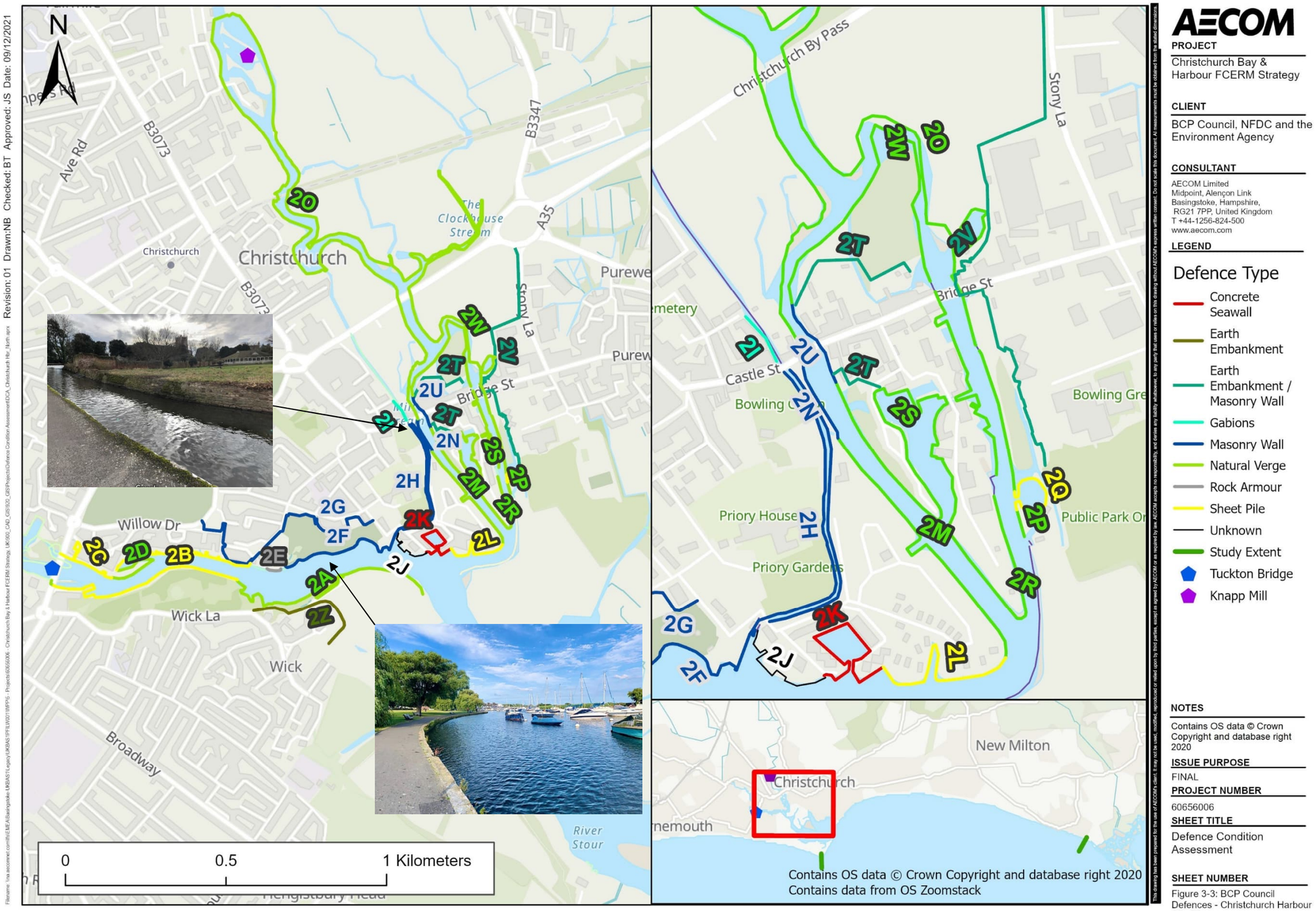
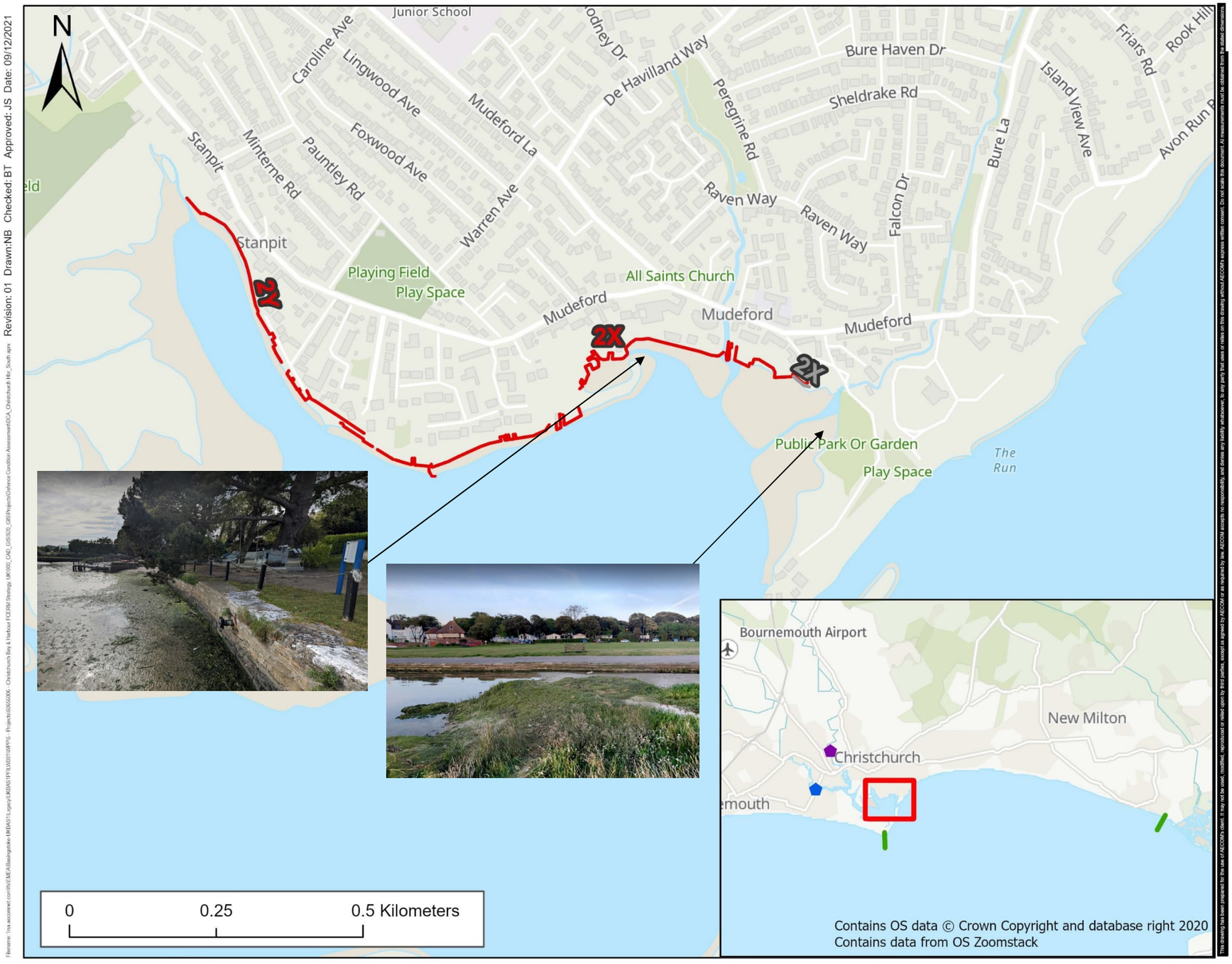


Figure 3-3: Defence Types in BCP Council area – Christchurch Harbour (North) (Frontage ID 2A – 2W)



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LEGEND

Defence Type
- Concrete Seawall
- Rock Armour
- Tuckton Bridge
- Knapp Mill
- Study Extent

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Figure 3-4: BCP Council Defences - Christchurch Harbour (South)

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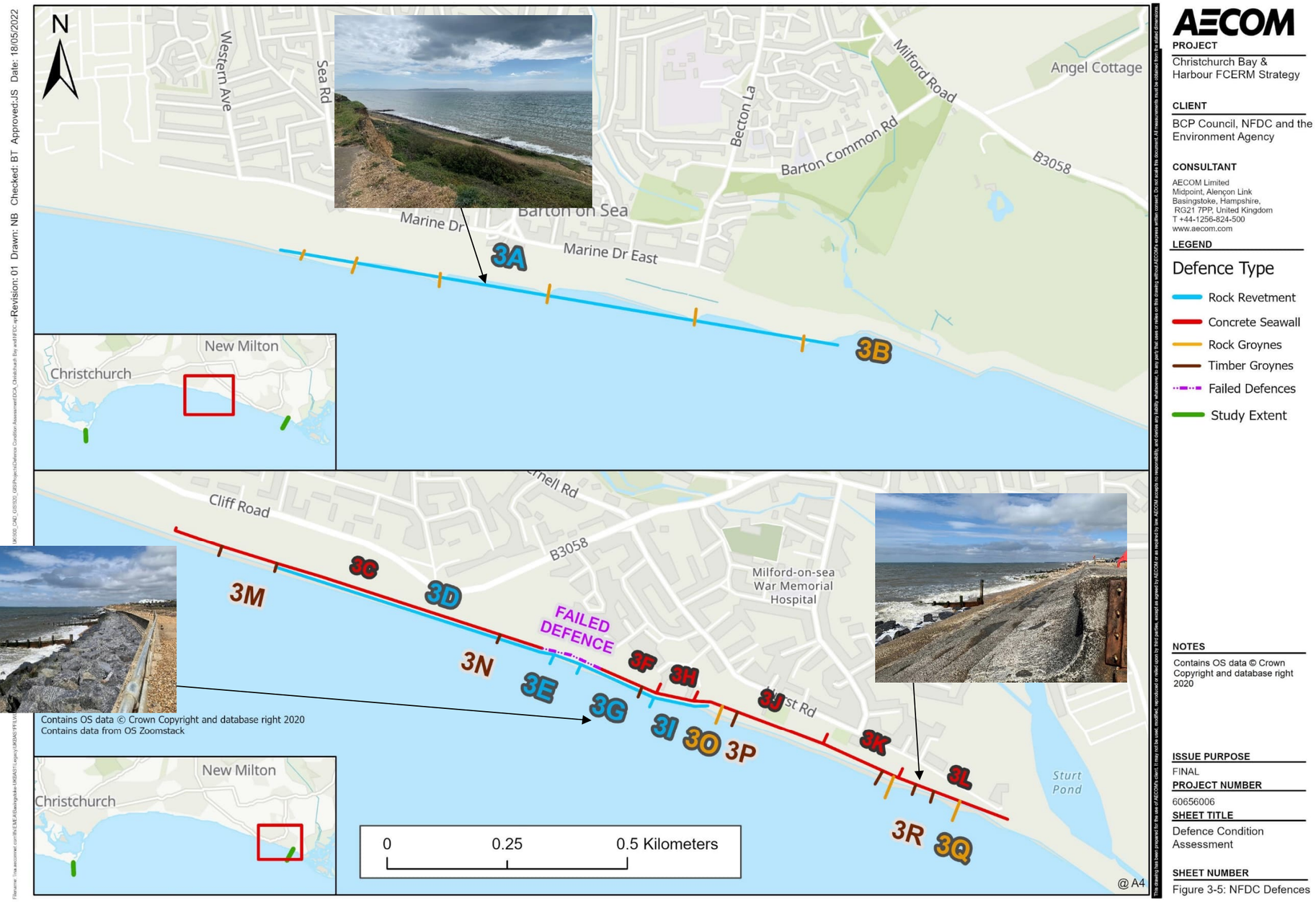
Figure 3-4: Defence Types in BCP Council area – Christchurch Harbour (South) Frontage ID (2R – SU)



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LEGEND

Defence Type
- Rock Revetment
- Concrete Seawall
- Rock Groynes
- Timber Groynes
- Failed Defences
- Study Extent

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ISSUE PURPOSE
FINAL

PROJECT NUMBER
60656006

SHEET TITLE
Defence Condition Assessment

SHEET NUMBER
Figure 3-5: NFDC Defences

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Figure 3-5: Defence Types in NFDC area (Frontage ID 3A – 3R)

3.2 Summary

Table 3-3 and Table 3-4 below present a percentage breakdown of the defences in the BCP Council and NFDC areas by defence length and condition.

In these tables when calculating the overall length of defences with different condition ratings, in situations where a defence asset has multiple condition ratings, to be conservative the lowest condition rating has been used. For example, if a defence asset has a rating of fair / poor, the full length of the asset has been added to the 'poor' total.

Whilst the defence condition data relates to the assets located within the BCP Council and NFDC areas, not all of these defences are owned and maintained by the local authority (as shown in Figure 2-1 to Figure 2-4). Many of the assets in poor condition are privately owned and maintained, and it is therefore not the responsibility of the local authority to undertake maintenance on these assets. The condition of a significant length of the defences in the BCP area is unknown due to private ownership / not being accessible.

Table 3-3: BCP Council Defence Condition Lengths

Defence Grade	Defence Condition	Length (m)	Length (%)
1	Very Good	0	0
2	Good	6,810	24
3	Fair	7,070	25
4	Poor	2,035	7
5	Very Poor	0	0
-	Unknown	12,070	43

Table 3-4: NFDC Defence Condition Lengths

Defence Grade	Defence Condition	Length (m)	Length (%)
1	Very Good	230	4
2	Good	1,000	18
3	Fair	3,630	65
4	Poor	760	14
5	Very Poor	0	0
-	Unknown	0	0

Across the full Strategy frontage, by length, approximately 8% of all of the defences are estimated to be in a poor condition, 32% in a fair condition and 23% in a good condition. 1% in a very good condition and 36% in an unknown condition (private or inaccessible).

4. Residual Life

The estimated residual life of the defences within the Strategy area are summarised in Figure 4-1 to Figure 4-4 (overleaf).

Based on this information, the following frontages have been identified as priority areas which warrant further attention from the landowners and will also require consideration as part of the Strategy. These priority areas have been identified where extensive lengths of defence are in a poor condition with an estimated residual life < 10 years.

- Frontages 1A, 1B, 1C – defences at Hengistbury Head, including gabions, rock armour and concrete revetment;
- Frontages 1I, 1J, 1K 1L, – timber and rock groynes at Mudeford and Friars Cliff, and Friars Beach seawall and promenade; and,
- Frontages 3H to 3R – defences at Milford on Sea including concrete seawall, rock revetment timber groynes and rock groynes.

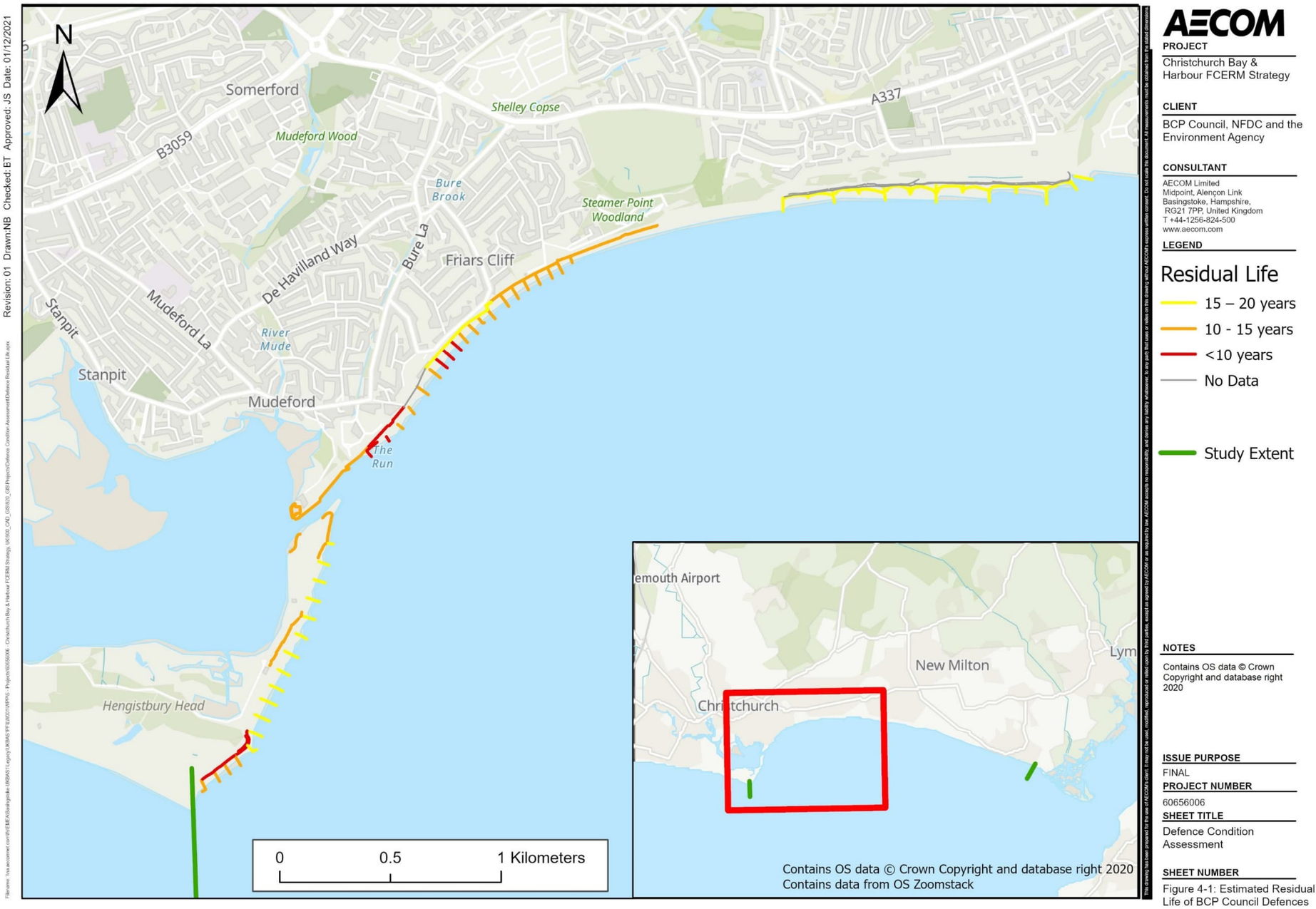


Figure 4-1: Estimated Residual Life of BCP Council Defences (Christchurch Bay), excluding maintenance

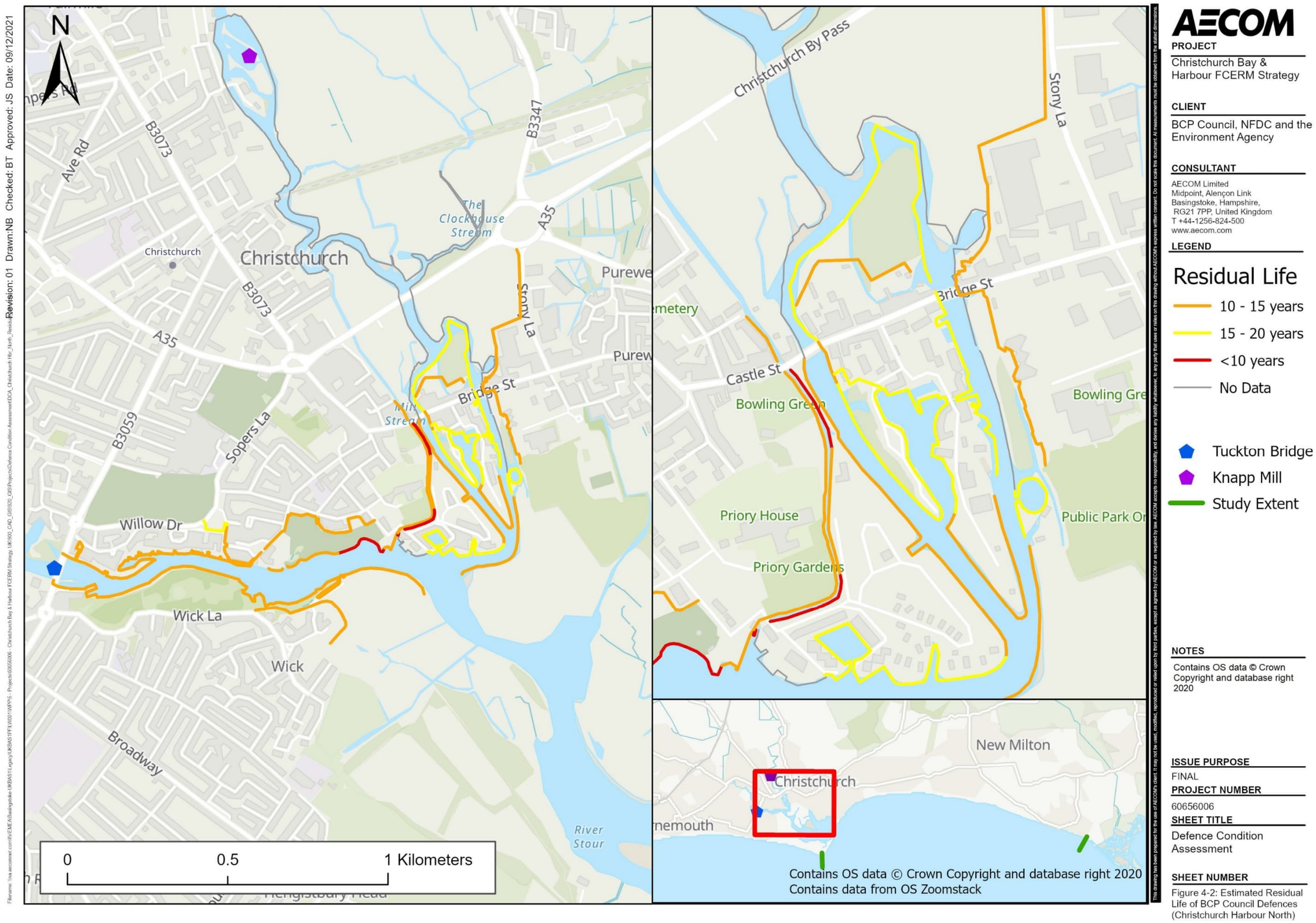
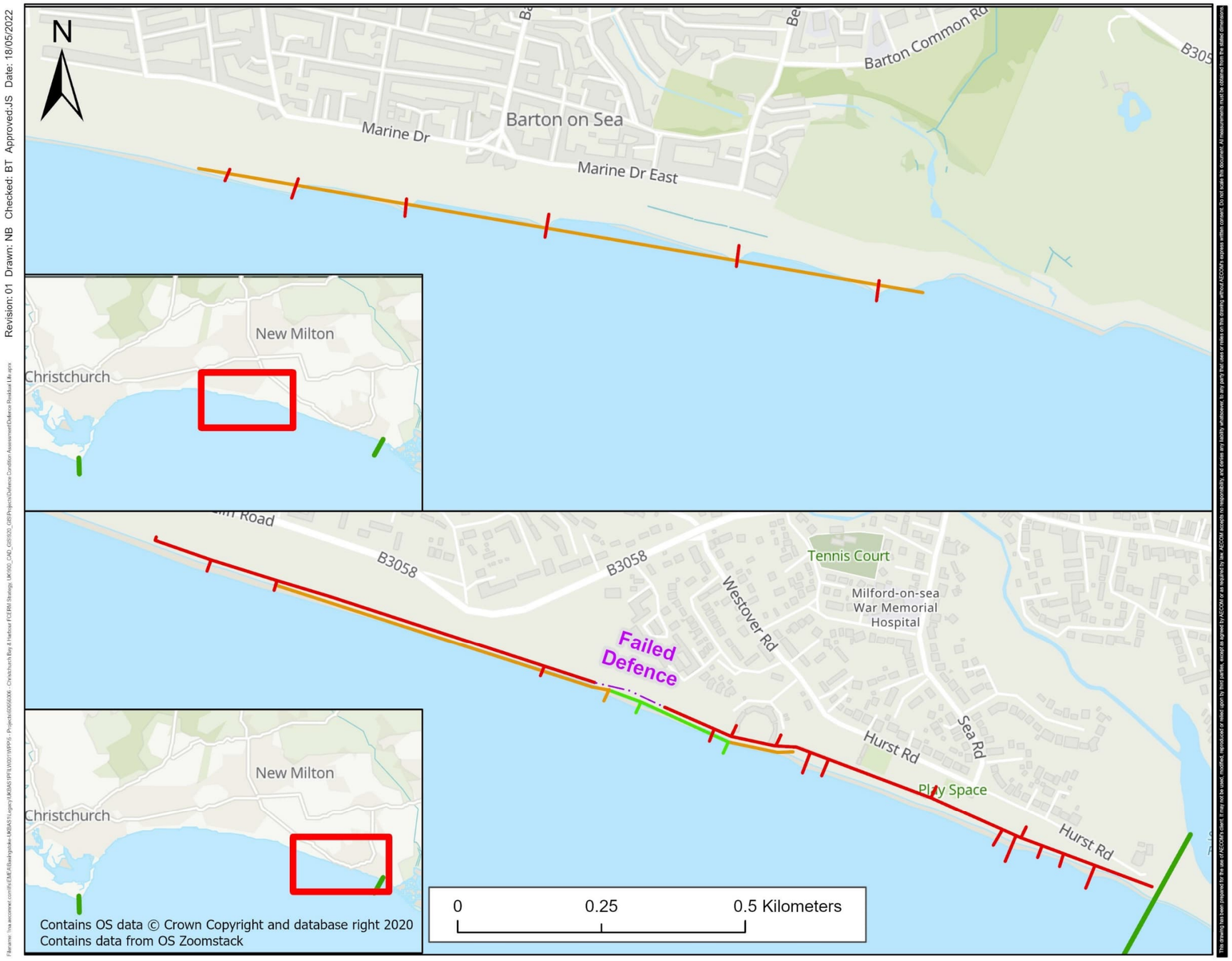


Figure 4-2: Estimated Residual Life of BCP Council Defences (Christchurch Harbour - North), excluding maintenance

Figure 4-3: Estimated Residual Life of BCP Council Defences (Christchurch Harbour - South), excluding maintenance



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PROJECT
Christchurch Bay & Harbour FCERM Strategy

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LEGEND

Residual Life
- >20 years
- 15 – 20 years
- 10 – 15 years
- <10 years
- Study Extent
- Failed Defences

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Figure 4-4: Estimated Residual Life of NFDC Defences

Figure 4-4: Estimated Residual Life of NFDC Defences, excluding maintenance

5. Standard of Protection

To provide an insight into the Standard of Protection (SoP) of the defences within Christchurch Harbour (with respect to coastal flood risk) the flood mapping for the present day scenarios have been interrogated in GIS. The present day scenarios were provided to the Strategy by the Lower River Avon Study (Environment Agency, 2022). The following return periods were made available; 1:2yr. 1:5yr, 1:10yr, 1:20yr, 1:30yr, 1:50yr, 1:75yr, 1:100yr, 1:200yr and 1:1000yr.

Where the model simulations indicate that flood water appears to flow over the defences, an indicative SoP has been identified based on the onset of risk. It should be noted that whilst interrogation of the model outputs in this way provides an indication of SoP, there is uncertainty in this approach as there is potential for flood water behind defences to have flowed from adjacent areas rather than directly over the defences in that location. Where uncertainty exists in the interpretation of the flood mapping this has been stated.

The approach to assessing SoP will assumes that the defence structures will not be breached in the future. Should a defence breach, the SoP will fall further, although the severity of flooding will be related to the land levels behind the defence. Table 5-1 below shows the indicative SoP of the defences in Christchurch harbour based on this assessment.

Table 5-1: Indicative SoP of defences in Christchurch Harbour

Defence	Indicative SoP	Notes
2A	1:5	Flood cell joins adjacent area, potential for flooding around defences
2B	1:10	
2C	1:2	
2D	1:50	Flood cell joins adjacent area, potential for flooding around defences
2E	1:200	
2F	1:2	
2G	>1:1000	
2H	1:30	
2I	1:30	
2J	1:2	
2K	1:75	Flood cell joins adjacent area, potential for flooding around defences
2L	1:2	Flood cell joins adjacent area, potential for flooding around defences
2M	1:2	Flood cell joins adjacent area, potential for flooding around defences
2N	1:2	
2O	1:2	
2P	1:2	Flood cell joins adjacent area, potential for flooding around defences
2Q	1:2	Flood cell joins adjacent area, potential for flooding around defences
2R	1:2	Flood cell joins adjacent area, potential for flooding around defences
2S	1:2	
2T	1:1000	
2U	1:1000	
2V	>1:1000	
2W	1:2	
2X	1:2	
2Y	1:20	

Defence	Indicative SoP	Notes
2Z	1:2	