Christchurch Bay and Harbour Flood and Coastal Erosion Risk Management Study

Technical Annex 7: Condition Assessment & Beach Profile Analysis

Prepared by

New Forest District Council

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Contents

1. Introduction

There has been a long history of coastal protection in Christchurch Bay. The Bay is characterised by soft cliffs which are vulnerable to erosion by wave attack. The construction of cliff-top property during the 20th century has created the need to prevent or reduce the rate of erosion and has resulted in cliff stabilisation work and the construction of coast protection measures. The assets which constitute the coast protection measures consist of a combination of along-shore defences and cross-shore structures. Along-shore defences, such as revetments and seawalls, protect the toe of the cliff from wave attack by dissipating or reflecting wave energy. Cross-shore structures such as timber and rock groynes are designed to interrupt long-shore drift and maintain a beach which provides a natural defence to wave attack.

The coastal frontage in Christchurch Bay extends across the boundaries of three Coast Protection Authorities; Bournemouth Borough Council, Christchurch Borough Council and New Forest District Council. Historically, work has been carried out on a District level, in response to local demands on the coastline. This approach to coastal protection has led to there being varying degrees of protection around the Bay and has resulted in an irregular coastal profile. In addition, structures have contributed to the interruption of and reduction in the amount of material in the coastal system, thus increasing erosion at other locations in the Bay and increasing the need for further coastal protection structures.

Due to the morphology of Christchurch Bay wave conditions vary along the coastline. The design of coastal assets has taken these factors into account. Consequently an assortment of types and styles of asset have been implemented around the Bay. The type of assets utilised have also varied due to the availability of funding, construction materials, as well as the variable environmental considerations and social issues. Due to changing requirements and demands on the coastline, varying coastal protection measures have been implemented at differing times over the last century. These assets have deteriorated over time and subsequently been subject to maintenance and replacement work. This has resulted varying conditions of defences and structures around the Bay, from very good to very poor condition.

Figure 1.1 Rock strongpoint at Highcliffe

Figure 1.2 Timber groyne & seawall at Milford-on-Sea

The condition of all assets has been evaluated for the Christchurch Bay Strategy Study in order to establish a baseline of what the current condition level is. By assessing the present condition of the asset an estimate on the residual life can be generated should maintenance be terminated under a 'Do Nothing' scenario. Depending on the location, following the failure an asset, cliff erosion is likely to ensue. This provides a starting point from which to introduce future cliff erosion scenarios in order to assess when cliff top property is likely to be affected. Furthermore, existing coast protection measures can be evaluated in terms of maintenance requirements with regard to possible future management options.

2. Methodology

2.1. AIMS

This Strategy aims to evaluate Christchurch Bay as a single coastal cell. This concept has been adopted for referencing of coast protection measures within the Bay. At present the numbering of assets has been referenced locally on a district level. This means that the location of individual defences or structures cannot be correctly identified from a bay-wide standpoint, or a national perspective. The Strategy therefore adopted a method of referencing which has been developed for the National Flood and Coastal Defence Database (NFCDD). The NFCDD project is a single, easily accessible and definitive store for all data on flood and coastal assets in England and Wales. The development of NFCDD is a requirement under DEFRA's High Level Targets (Target 4A) for Flood and Coastal Defence, published in November 1999.

In NFCDD the entire coastline is referenced with respect to the particular along-shore defence, for example a length of seawall or revetment. Each cross-shore structure (eg. groyne) is then referenced according to whichever defence it relates to (i.e. is perpendicular to, or "hangs" from). The defences become components of the frontage unit which correlate with Shoreline Management Plan (SMP) Management Units. However, in contrast to the SMP, the units are numbered in a clockwise direction around the coast. NFCDD referencing also makes provision for this through the individual ownership and management of Frontage Units and Sub Units (Table 2.1).

NFCDD Reference Coding Format	Example
Region Number	7
Area Number	1
Sub-area Number	Blank
Frontage	R906
Frontage Unit	02
Frontage Sub-unit	1
Coastal Indicator	C
Defence Number	04
Structure Reference	001

Table 2.1 Example of the format used in NFDCC for coastal references

A specific assessment method, the condition assessment checklist, was developed for this Strategy and incorporated the Environment Agency visual condition assessment criteria published in the National Sea & River Defence Surveys Condition Assessment Manual. This enabled a visual assessment to be undertaken to determine the overall condition of the asset. As the inspections of the assets were carried out on site, a spreadsheet was developed which enabled items to be individually assessed. The spreadsheets were designed with the aim of being able assess the condition of the asset by visual assessment using the condition checklist. This approach was adopted in order that an engineer could carry out the assessment in a non-subjective manner. Individual spreadsheets have been developed for all assets (concrete seawall; rock revetment; timber groynes; rock groynes / strongpoints), each of which is presented in Appendix A (Table A.1 to A.5).

2.2 ASSET CONDITION ASSESSMENT PROCEDURE

2.2.1. Field apparatus

Digital camera (plus spare camera cards and batteries)
Aerial photograph map book
Fieldwork sheets

2.2.2. Asset inspections

Using fieldwork sheets, an individual assessment of all assets was undertaken in the field. Depending on what was highlighted in the checklist, each defence or structure was assigned a score to represent the overall condition of the asset. By using the spreadsheets the process of assessing the assets could be undertaken with a low level of subjectivity.

Each Asset was assessed using the following scoring system:

Very good	-	Condition 1	(colour blue)
Good	-	Condition 2	(colour light blue)
Fair	-	Condition 4	(colour yellow)
Poor	-	Condition 4	(colour orange)
Very poor	-	Condition 5	(colour red)

When multiple elements make up an Asset, the overall score is taken from the worst scoring element within the Asset. Where possible, photographs were taken of each Asset.

2.2.3. Asset location

The location of each 'along shore' defence was established by identifying the start and end point of the defence using an up-to-date aerial photograph within a GIS layer. Once identified, each defence was named in accordance with the NFCDD numbering system. Subsequently, each 'cross shore' structure could then be numbered according to the relevant 'along shore' defence reference.

2.3 CONDITION ASSESSMENT

Asset inspections were conduced along the Christchurch Bay frontage in August 2003. The section of coastline measured 16.4 km from Hengistbury Head to Hurst Spit Castle Point, contained 114 along-shore defences and 94 cross-shore structures. Table 2.2 (below) provides a summary of the combined condition for all Assets.

ASSET ELEMENT						TOTAL
	1 Very Good	2 Good	3 Fair	4 Poor	5 Very Poor	
Defences (revetment)	16	69	27	2	0	114
Structures (groynes)	21	47	21	5	0	94

Table 2.2 Combined condition summary for all assets

Table 2.2 indicates that of the 94 Structures (e.g. groynes), 89 were of condition 3 or better (95%), and 5 were of condition 4 or 5 (9%). In general the majority of the defences and structures have been classed as OK to new/very good condition.

Table 2.3 details the combination of the defence and structure condition rating.

		Defence Condition					
		1	2	3	4	5	None
Structure Condition	1	2	14	5			
	2	7	26	10			4
	3	2	12	4	1		2
	4		2	2	1		
	5						
	None	5	15	6			

Table 2.3 defence and structure rating

Table 2.3 indicates that there were only 2 records of both defence and structure being awarded condition 1 status, and 12 records where defences were of condition 2 and structures of condition 3. The combination of structures and defences in condition 1 or 2 totalled 49 whereas the combination of structures and defences in condition 4 or 5 totalled 1.

2.4 RESIDUAL LIFE

Following the generation of condition values for all the Assets, each Asset was evaluated in terms of its residual life, if a 'Do Nothing' scenario was adopted and all maintenance work ceased. This is the estimated amount of time that it would take until the Asset degrades to such a level that it offers little or no value as a coast protection measure (i.e. when the Asset effectively becomes a condition 5). The time interval is based on the likely serviceable life-span of a particular Asset from new, less the time it is estimated to have taken for the Asset to attain its present condition. The serviceable life of all Assets within the Bay is based upon a working knowledge of what the expected life-span of particular structures and defences is likely to be in view of the possible conditions and level of energy in the system. The residual life is expressed as a future date by adding the estimated time it would take to become a condition 5 to the present date (yr 2003). Table 2.4 (below) provides details of what the estimated residual life expectancy of particular Assets is likely to be, relative to the condition of the Asset.

	Asset condition / estimated residual life of Asset				
	1	2	3	4	5
Concrete / steel	30 years	20 years	10 years	5 years	2 years
Mendip limestone	30 years	20 years	10 years	5 years	2 years
Portland limestone	20 years	15 years	10 years	5 years	2 years
Hardwood	10 years	5 years	3 years	2 years	1 years

Table 2.4 Estimated residual life expectancies

Details of all condition assessments and estimated residual life calculations for all Assets are produced in Table B1 in Appendix B and illustrated in aerial photograph overlays in Figure B.1 to B.9. Table B1 indicates that currently 25% of 'cross-shore' structures will need replacing between 2003 (year 0 of strategy study) and 2023 whereas only 6% of 'along shore' defences will need replacing before 2023.

3. Beach Profile Analysis

3.1 DATA ANALYSIS

In order to study the changes occurring to the coastline, beaches in Christchurch Bay have been monitored on a regular basis (3 to 4 times per year) over 18 years. The monitoring has consisted of repeated measurements of the cross-section of the beach along a predefined beach profile. The monitoring, originally carried out by New Forest District Council, is currently carried out by the Channel Coastal Observatory (CCO) as part of the Regional Monitoring Programme for the South East of England. Beach profile data was obtained from the New Forest District Council database, which is regularly updated and maintained by the CCO. After reviewing all available data, the longest datasets were selected at various locations around Christchurch Bay. This would provide the highest amount of confidence regarding the identification of long term changes.

The beach provides a natural defence to wave erosion as beach material acts to dissipate wave energy. Although the existing coast protection measures around Christchurch Bay have successfully reduced the amount of erosion, the consequence to this is that as the amount of erosion has reduced the supply of material into the system has also declined. Defended sections, which contain cross-shore structures such as groynes, also act to trap material which is being transported under the process of long-shore drift. The effect that this can have is that undefended sections of coastline become progressively starved of sediment leading to an increase in the rate of erosion. Defended areas can also become affected by the reduction of sediment in the system. Reduced beach levels can lead to coastal defences becoming subject to an increased level of wave attack and increasingly more unstable due to the effect of unloading at the toe of the defence.

At each profile location all the survey data has been analysed to determine the position of the Mean Low Water (MLW) contour, the beach gradient and the cross-sectional area over time. This has enabled trends to be identified in order to qualify changes to the beaches around Christchurch Bay.

3.1.1 The position of the Mean Low Water contour

Each pre-defined beach profile is referenced to a zero point located landward of the coastline. The line extends positively seawards well beyond the toe of the beach. The level of the MLW contour has been defined as -0.78mOD. Where possible, the distance from the zero point to the MLW contour was measured for each survey and plotted against time at each location. A linear trend was added to highlight change over the time. An example of a MLW contour graph is given in Figure 3.1

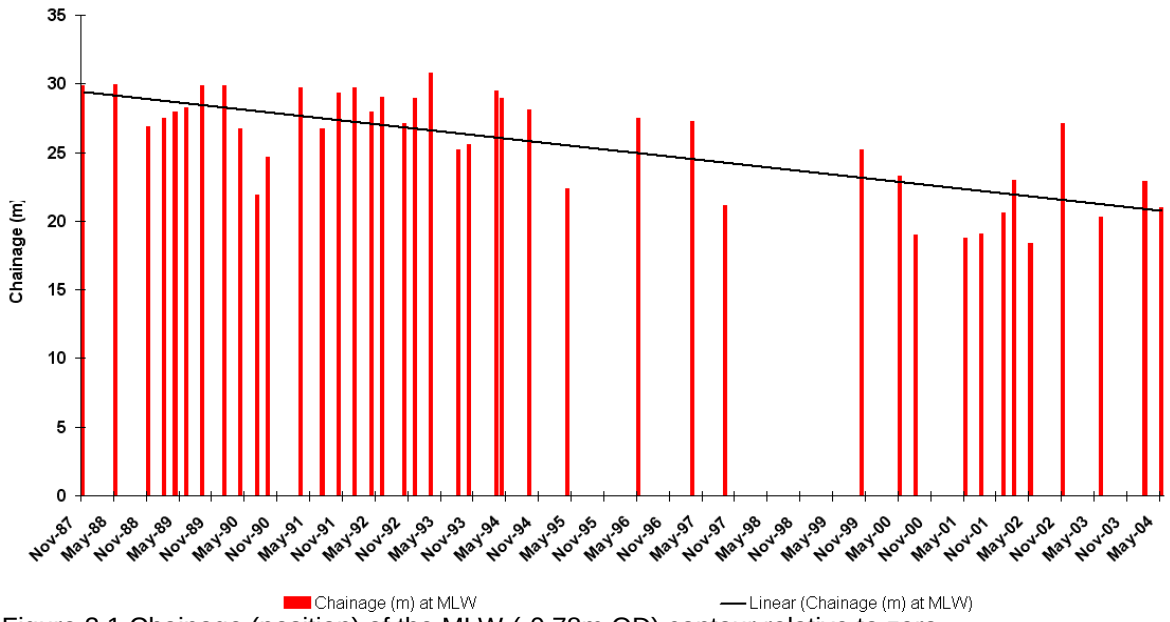


Figure 3.1 Chainage (position) of the MLW (-0.78m OD) contour relative to zero

3.1.2 Beach Gradient

The gradient within the inter-tidal zone is an indication of whether the beach is steepening or flattening. For each survey at each profile location the gradient of the beach was calculated between Mean High Water (MHW) (0.67mOD) and Mean Low Water (MLW) (-0.78mOD). The gradient value has been plotted against time and a trend line has been added. An example of a beach gradient graph is given in Figure 3.2.

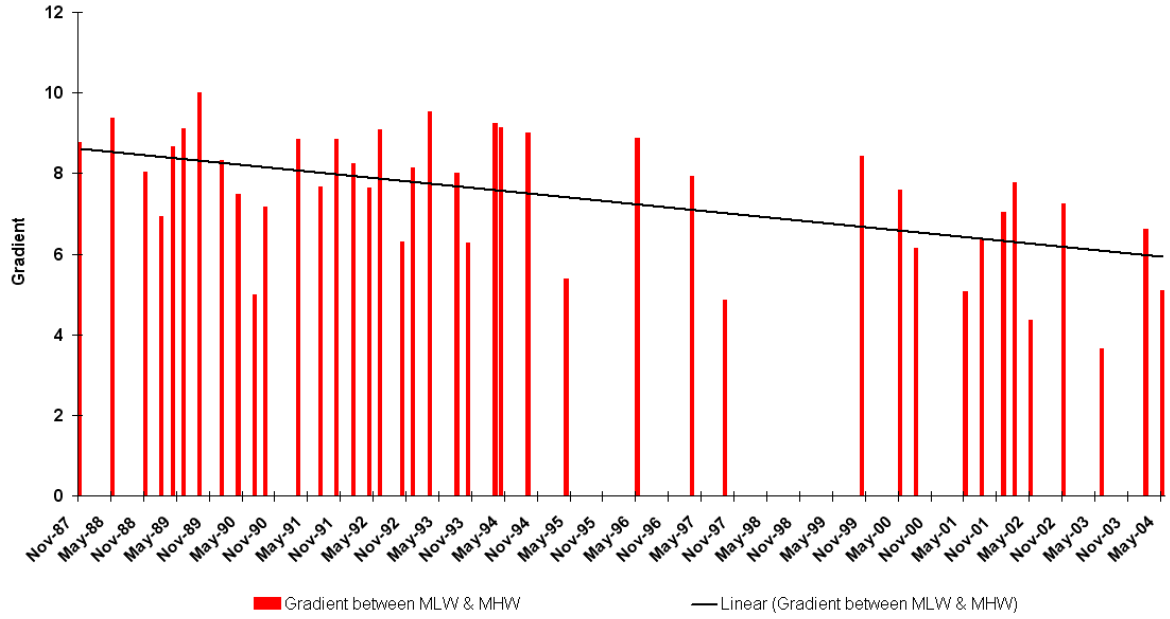


Figure 3.2 Gradient of beach slope between MHW & MLW (0.67m OD & -0.78m OD)

3.1.3 Cross-sectional Area

The cross-section of the beach is an indication of the efficiency of the cross-shore structures and the amount of material available in the system. The cross-sectional area measured between MHW (0.67mOD) and MLW (-0.78mOD) has been calculated for each survey on each profile line. Linear trends have been determined. An example of a cross-sectional area graph is given in Figure 3.3.

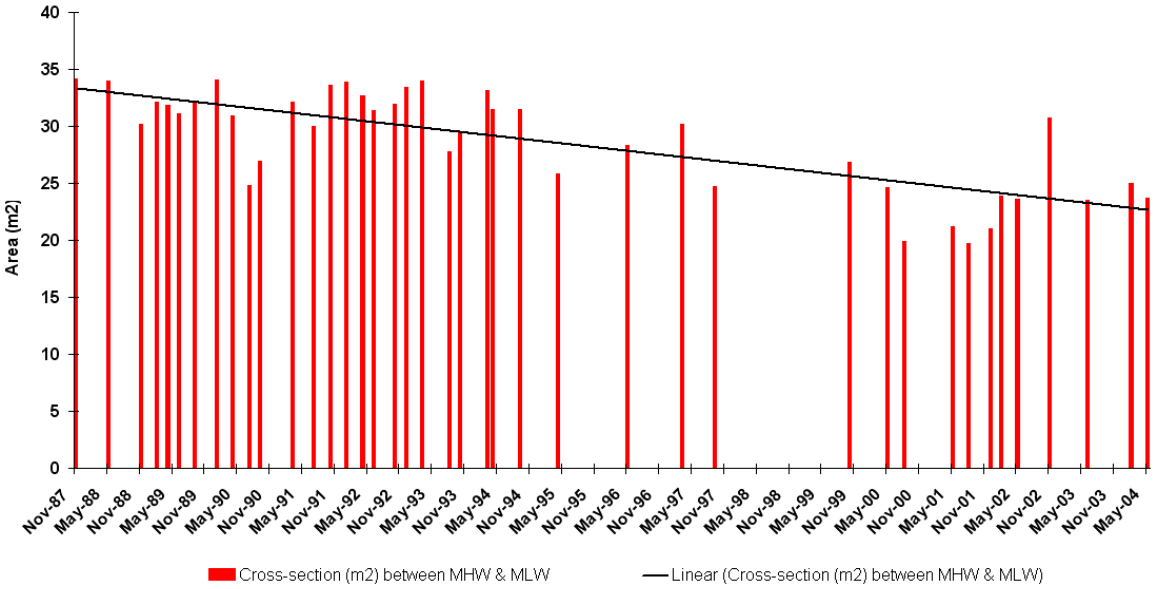


Figure 3.3 Cross-sectional area (m²) between MHW & MLW (0.67m OD & -0.78m OD)

Section D of the Appendix contains all graphs for the MLW position, gradient of the beach, and cross-sectional area at all profile locations around Christchurch Bay. Trends identified from the graphs in Section D of the appendix are summarised in Table 3.1 (below).

	Profile Line	**MLW position trend**	**Beach Gradient**	**Cross-sectional Area m2**
CBY6	5f00070	Stable / no change	steepening	No change
	5f00076	MLW regression	No change	decreasing
	5f00082	MLW regression	steepening	decreasing
	5f00091	MLW regression	steepening	decreasing
	5f00099	Stable / no change	No change	decreasing
	5f00107	MLW regression	No change	decreasing
	5f00121	MLW regression	No change	decreasing
CBY5	5f00125	MLW regression	No change	decreasing
	5f00130	MLW regression	shallowing	decreasing
	5f00135	MLW regression	No change	decreasing
	5f00140	Accretionary trend	No change	No change
	5f00145	Stable / no change	No change	decreasing
	5f00155	MLW regression	shallowing	decreasing
	5f00161	MLW regression	No change	decreasing
CBY4	5f00165	Accretionary trend	No change	Slight increase
	5f00169	MLW regression	steepening	decreasing
	5f00175	Accretionary trend	No change	Slight increase
	5f00181	MLW regression	No change	Slight increase
	5f00186	MLW regression	steepening	increasing
	5f00191	Stable / no change	shallowing	decreasing

	5f00195	Stable / no change	steepening	increasing
	5f00197	Accretionary trend	shallowing	Increasing
CBY3	5f00202	MLW regression	No change	decreasing
	5f00209	Accretionary trend	shallowing	increasing
	5f00215	Accretionary trend	shallowing	increasing
	5f00222	Accretionary trend	shallowing	No change
	5f00225	Accretionary trend	shallowing	increasing
	5f00229	Accretionary trend	No change	No change
	5f00257	Accretionary trend	steepening	increasing
	5f00261	Accretionary trend	steepening	No change
CBY2	5f00264	Accretionary trend	No change	No change
	5f00272	Accretionary trend	No change	increasing
	5f00276	Accretionary trend	shallowing	No change
	5f00280	Stable / no change	No change	No change
	5f00284	MLW regression	No change	decreasing
	5f00288	Stable / no change	shallowing	decreasing
	5f00296	Accretionary trend	steepening	decreasing
	5f00300	Accretionary trend	shallowing	increasing

Table 3.1 Trends identified from beach profile analysis

3.2 FORECASTING FUTURE DEFENCE FAILURE

Beach profile analysis has indicated that there are a number of locations around Christchurch Bay where the MLW contour (-0.78mOD) is regressing landwards. The trendline can be projected forward in order to predict where the future position of MLW is likely to be in order to assess the evolution of the Bay. This is illustrated in Figure 3.1.

In locations where along shore defences exist, the presence of a beach is important for the stability of the defence. Once the MLW contour reaches the toe of the defence (MLW expiry date), unless recharge material is added, the benefits offered by a beach are lost. This therefore results in an increased risk of structural failure occurring as the weight offered by the presence of a beach to the toe of the defence is reduced. In addition, wave energy will not be dissipated as effectively by the beach, the defence will be subject to an increased level of wave impact. Furthermore, without a beach in front of the defence, the potential for the along shore defence to reflect wave energy and induce scour in front of the defence is increased, thus intensifying the risk that structural failure will occur. Figure 3.4 (below) illustrates how the MLW expiry date is generated.

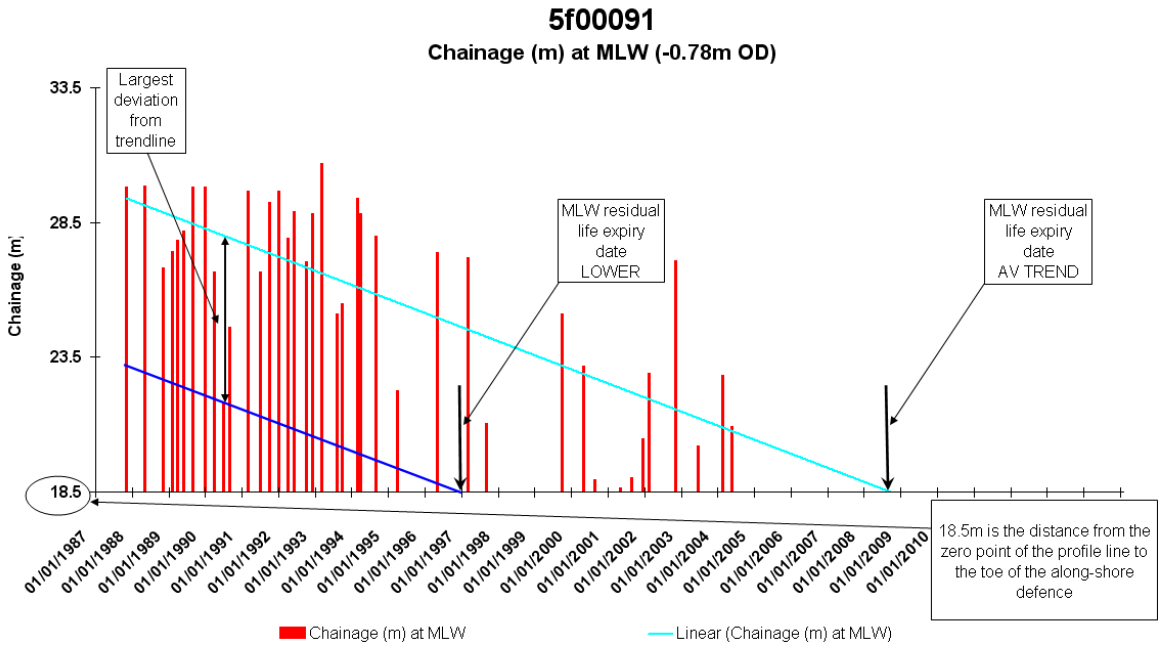


Figure 3.4 MLW expiry date forecast (lower & average trend) for profile location 5f00091

Figure 3.4 indicates the trendline for the lower and average trend expiry date. The average trend expiry date is generated by extending the average (regression) trendline (coloured light blue in figure 3.4) into the future until it meets the defence toe chainage position (i.e. the point in the future when MLW coincides with the toe of the defence). The lower trend expiry date has been generated to take into account the contribution of beach draw down caused by seasonal variation or following storm events. Over the period the profile has been surveyed, there has been a significant deviation between the recorded chainage position and the average trendline position. The lower deviation is important as it represents a scenario when the MLW is significantly closer to the toe of the defence (in comparison with the average trend rate). Although the MLW position is not maintained, during these periods the risk of structural failure is considerably increased. Therefore in order to take the lower deviation into account the lowest recorded deviation is selected and the trendline applied to this lower level (coloured dark blue in figure 3.4). The lower trend line is again projected into the future until it meets the defence toe chainage position. Lower and average trend expiry dates have been calculated at all profile locations where regression has been identified and the complete results are presented in Appendix E (Table E.1). A summary of the results is presented in Table 3.2 (below).

	Profile Line	MLW position forecast
CBY6	5f00070	Stable / no change
	5f00076	MLW to reach toe of defences between 2024 & 2053
	5f00082	MLW to reach toe of defences between 2003 & 2023
	5f00091	MLW to reach toe of defences between 2003 & 2023
	5f00099	Stable / no change
	5f00107	MLW to reach toe of defences between 2003 & 2023
	5f00121	MLW to reach toe of defences between 2024 & 2053
CBY5	5f00125	MLW to reach toe of defences between 2024 & 2053
	5f00130	MLW to reach toe of defences between 2024 & 2053
	5f00135	MLW to reach toe of defences between 2024 & 2053
	5f00140	Accretionary trend
	5f00145	Stable / no change
	5f00155	MLW to reach toe of defences between 2003 & 2023
	5f00161	MLW to reach toe of defences between 2003 & 2023
CBY4	5f00165	Accretionary trend

	5f00169	MLW to reach toe of defences between 2003 & 2023
	5f00175	Accretionary trend
	5f00181	MLW to reach toe of defences between 2003 & 2023
	5f00186	MLW to reach toe of defences between 2003 & 2023
	5f00191	Stable / no change
	5f00195	Stable / no change
	5f00197	Accretionary trend
CBY3	5f00202	MLW to reach toe of defences between 2054 & 2103
	5f00209	Accretionary trend
	5f00215	Accretionary trend
	5f00222	Accretionary trend
	5f00225	Accretionary trend
	5f00229	Accretionary trend
	5f00257	Accretionary trend
	5f00261	Accretionary trend
CBY2	5f00264	Accretionary trend
	5f00272	Accretionary trend
	5f00276	Accretionary trend
	5f00280	Stable / no change
	5f00284	MLW to reach toe of defences between 2003 & 2023
	5f00288	Stable / no change
	5f00296	Accretionary trend
	5f00300	Accretionary trend

Table 3.2 MLW position trend forecast

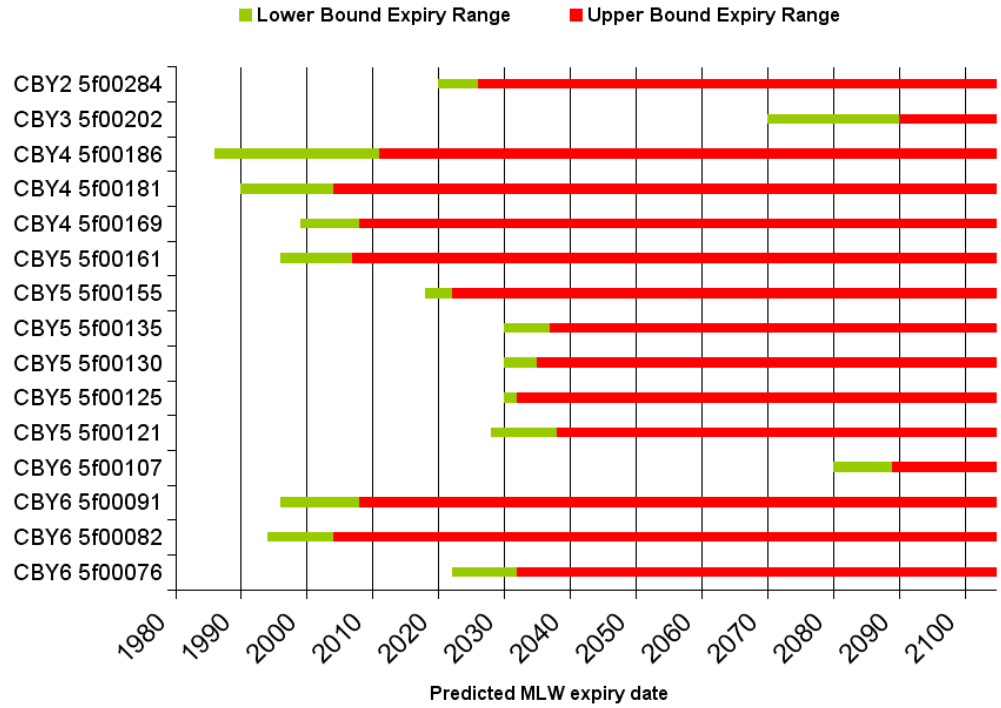


Figure 3.5 Lower and upper bound expiry dates

Figure 3.5 is a timeline which highlights when the lower and average trendlines are predicted to coincide with the toe of the defence. The start of the green bar in Figure 3.5 represents the earliest predicted date that MLW will reach the toe of the structure (taken from the lower trendline projection). The start of the red line is the predicted date when MLW will reach the toe of the structure (taken from the average trendline projection).

CMP UNIT	Profile	Structure type / beach	Residual life expiry date (condition inspection)	MLW Residual life expiry date (profile) LOWER	MLW Residual life expiry date (profile) AV. TREND
CBY6	5f00070	Seawall	2013	2110	2171
	5f00076	Seawall	2023	2022	2032
	5f00082	Seawall	2023	1994	2004
	5f00091	Seawall / Revetment	2023	1996	2008
	5f00099	Beach	2023	2111	2134
	5f00107	Beach		2080	2089
CBY5	5f00121	Beach		2028	2038
	5f00125	Beach		2030	2032
	5f00130	Beach		2030	2035
	5f00135	Beach		2030	2037
	5f00140	Beach			
	5f00145	Beach		2114	2139
	5f00155	Beach		2018	2022
	5f00161	Revetment	2023	1996	2007
CBY4	5f00165	Revetment	2023		
	5f00169	Revetment	2023	1999	2008
	5f00175	Revetment	2023		
	5f00181	Revetment	2023	1990	2004
	5f00186	Revetment	2023	1986	2011
	5f00191	Revetment	2023	2421	2568
	5f00195	Revetment	2023		
	5f00197	Revetment	2023		
CBY3	5f00202	Beach		2070	2090
	5f00209	Beach			
	5f00215	Beach			
	5f00222	Beach			
	5f00225	Beach			
CBY2	5f00229	Revetment	2023		
	5f00257	Beach			
	5f00261	Beach			
	5f00264	Beach			
	5f00272	Seawall	2023		
	5f00276	Seawall	2013		
	5f00280	Seawall	2013	2142	2156
	5f00284	Seawall	2023	2020	2026
	5f00288	Seawall	2033	3009	3205
	5f00296	Seawall	2023		
	5f00300	Seawall	2023		

Table 3.3 MLW expiry date comparison

Table 3.3 is a comparison between the predicted date of failure following the condition assessment undertaken in the field and the predicted expiry date derived from beach profile analysis trendline interpretation.

3.3 BEACH PROFILE ANALYSIS SUMMARY

Two methods have been used to estimate the residual life of along-shore defences. Although the MLW expiry date is not the actual date of failure, for the purpose of assessing the residual life of the defences within the 'Do Nothing' scenario, the MLW expiry date will be used in the same terms the residual life, as the risk of structural failure is significantly higher. Table 3.3 can therefore be used to compare results from the two methods in order to justify the residual life estimates generated by the condition assessment.

Beach profile analysis indicates that the MLW contour is regressing in all three sections of defended coastline. Although there is variability, in Unit CBY4 and Unit CBY6 there appears to be good correlation between the MLW expiry date and the residual life expiry date identified from the condition assessment. There is a long comprehensive dataset of beach profile data for the profiles in Unit CBY4 and Unit CBY6, thus providing considerable confidence in the analysis. Within Unit CBY4, a number of profiles have indicated that the lower expiry date has been passed and that the average expiry date has been reached. These profiles are located in a section of coastline where the wall has failed and that rock revetment has had to be placed in front of the wall in order to extend the life of the wall. The residual life of the defence has therefore been based on the residual life of the revetment structure.

The correlation between the two methods in Unit CBY2 is less positive than Unit CBY4 and Unit CBY6, however correlation does exist between the methods at profile 5f00284. The defence needs to remain intact in order for integrity of the unit to be preserved. If a section were to fail this would weaken the defence and increase the risk of further failures occurring. In addition, the beach profile dataset for this section is less comprehensive therefore reducing the confidence in the results.

	Profile	MLW recession rate (yr-1)	Distance: MLW trendline to zero (m)	Distance: zero to defence / cliff toe (m)	Distance: MLW trendline to defence	MLW Lowest deviation from trendline	Date of last survey	Defence type / beach	Residual life expiry date (inspection)	MLW Residual life expiry date (profile) LOWER	MLW Residual life expiry date (profile) AV. TREND
UNIT	5f00070	-0.12	26	6	20	7.3	2004	Seawall	2013	**2110**	**2171**
CBY6	5f00076	-0.66	21.5	3	18.5	6.75	2004	Seawall	2023	**2022**	**2032**
	5f00082	-0.46	13	13	0	4.5	2004	Seawall	2023	**1994**	**2004**
	5f00091	-0.52	21	19	2	6	2004	Seawall / Revetment	2023	**1996**	**2008**
	5f00099	-0.24	34	3	31	5.5	2004	Beach	2023	**2111**	**2134**
	5f00107	-0.54	46	0	46	5	2004	Beach		**2080**	**2089**
UNIT	5f00121	-1.19	142.5	102	40.5	12	2004	Beach		**2028**	**2038**
CBY5	5f00125	-1.21	125	91	34	2	2004	Beach		**2030**	**2032**
	5f00130	-0.97	133	103	30	5	2004	Beach		**2030**	**2035**
	5f00135	-0.85	118	90	28	6	2004	Beach		**2030**	**2037**
	5f00140	0.19	120	92	28	8	2004	Beach		2107	2148
	5f00145	-0.24	120.5	88	32.5	6	2004	Beach		**2114**	**2139**
	5f00155	-1.82	104	72	32	6	2004	Beach		**2018**	**2022**
	5f00161	-0.906	116	113	3	10	2004	Revetment	2023	**1996**	**2007**
UNIT	5f00165	0.1404	177.5	153	24.5	4	2004	Revetment	2023	2150	2179
CBY4	5f00169	-0.6588	152.5	150	2.5	6	2004	Revetment	2023	**1999**	**2008**
	5f00175	0.0828	161.5	135	26.5	5.5	2004	Revetment	2023	2258	2324
	5f00181	-0.1428	131	131	0	2	2004	Revetment	2023	**1990**	**2004**
	5f00186	-0.138	152	151	1	3.5	2004	Revetment	2023	**1986**	**2011**
	5f00191	-0.0408	178	155	23	6	2004	Revetment	2023	**2421**	**2568**
	5f00195	0.0324	163	158	5	8	2004	Revetment	2023	2097	2158
	5f00197	2.3352	193	181	12	8	2004	Revetment	2023	2002	2009
	5f00202	-0.3492	211	181	30	7	2004	Beach		**2070**	**2090**
	5f00209	0.21	199	170	29	5	2004	Beach		2118	2142
UNIT	5f00215	0.348	213.5	185	28.5	9	2004	Beach		2060	2086
CBY3	5f00222	0.456	209	175	34	8	2004	Beach		2061	2079
	5f00225	12.5772	210	160	50	15	2004	Beach		2007	2008
UNIT	5f00229	0.2736	66	43	23	2	2004	Revetment	2023	2081	2088
CBY2	5f00257	1.0524	265	200	65	7	2004	Beach		2059	2066
	5f00261	1.2288	285	215	70	4	2004	Beach		2058	2061
	5f00264	1.4556	230	165	65	0	2004	Beach		2049	2049
	5f00272	1.0512	189	151	38	6	2004	Seawall	2023	2034	2040
	5f00276	0.2484	165	128	37	0	2004	Seawall	2013	2153	2153
	5f00280	-0.2724	126.5	85	41.5	4	2004	Seawall	2013	**2142**	**2156**
	5f00284	-1.2972	220	191	29	8	2004	Seawall	2023	**2020**	**2026**
	5f00288	-0.0408	197	148	49	8	2004	Seawall	2033	**3009**	**3205**
	5f00296	0.0888	226.5	179	47.5	5.5	2004	Seawall	2023	2477	2539
	5f00300	1.668	363	347	16	12	2004	Seawall	2023	2006	2014

Annex A: Examples of fieldwork spreadsheets

TIMBER REVETMENT SURVEY - CHRISTCHURCH BAY

REFERENCE	COORDINATES	
	START	END

PHOTOGRAPHS	
1	
2	
3	

INSPECTOR	
DATE	
WEATHER	
TIDE	

DESCRIPTION	(tick)	% (of structure)
CONDITION 1		
sound planks, piles & fixings		
minimal gap between boards		
minimal erosion of timbers		
CONDITION 2		
reasonably sound planks, piles & fixings		
Intermediate level of erosion		
gap between planks		
CONDITION 3		
moderate level of timber erosion		
occasional loss of planks		
occasional fixings failed		
CONDITION 4		
substantial loss of planks and fixings		
distressed timbers / high level of erosion / corrosion		
CONDITION 5		
groyne failed or derelict		
failure of most fixings		
substantial timber erosion		
OVERALL CONDITION		

DESCRIPTION OF ASSET	
DATE CONSTRUCTED	
DIMENSIONS (m)	ELEVATION (m OD)
CONSTRUCTION MATERIALS	
SPECIFIC DESCRIPTION	
OVERALL ASSESSMENT	
MAINTENANCE REQUIRED	
RESIDUAL LIFE (yrs)	

Table A.1

TIMBER GROYNE SURVEY - CHRISTCHURCH BAY

REFERENCE	COORDINATES	
	START	END

PHOTOGRAPHS	
1	
2	
3	

INSPECTOR	
DATE	
WEATHER	
TIDE	

DESCRIPTION	(tick)	% (of structure)
CONDITION 1		
sound planks, piles & fixings		
minimal gap between boards		
minimal erosion of timbers		
CONDITION 2		
reasonably sound planks, piles & fixings		
Intermediate level of erosion		
gap between planks		
CONDITION 3		
moderate level of timber erosion		
occasional loss of planks		
occasional fixings failed		
CONDITION 4		
substantial loss of planks and fixings		
distressed timbers / high level of erosion / corrosion		
CONDITION 5		
groyne failed or derelict		
failure of most fixings		
substantial timber erosion		
OVERALL CONDITION		

DESCRIPTION OF ASSET	
DATE CONSTRUCTED	
DIMENSIONS (m)	ELEVATION (m OD)
CONSTRUCTION MATERIALS	
SPECIFIC DESCRIPTION	
OVERALL ASSESSMENT	
MAINTENANCE REQUIRED	
RESIDUAL LIFE (yrs)	

Table A.2

ROCK STRONGPOINT SURVEY - CHRISTCHURCH BAY

REFERENCE	COORDINATES	
	START	END

PHOTOGRAPHS	INSPECTOR	
	DATE	
	WEATHER	
	LOW WATER	

DESCRIPTION	% (of structure)	tick
CONDITION 1		
major voids	<5%	
armour displacement	<5%	
settlement	<5% of length by < 0.2m	
Interlocking armour	>90%	
CONDITION 2		
major voids	5% - 10%	
armour displacement	5% - 10%	
Interlocking armour	>75%	
settlement	5% - 40% of length by < 0.5m	
CONDITION 3		
major voids	10% - 25%	
armour displacement	10% - 25%	
Interlocking armour	>50%	
settlement	40% - 60% by 0.5m - 1m	
CONDITION 4		
major voids	25% - 50%	
armour displacement	25% - 50%	
Interlocking armour >30%	>90%	
settlement	>60% by > 1m	
CONDITION 5		
Interlocking armour	<30%	
groyne failed	>50%	
OVERALL CONDITION		

DESCRIPTION OF ASSET	
DATE CONSTRUCTED	
DIMENSIONS (m)	ELEVATION (m OD)
ARMOUR SIZE / TYPE	
SPECIFIC DESCRIPTION	
OVERALL ASSESSMENT	
MAINTENANCE REQUIRED	
RESIDUAL LIFE (yrs)	

Table A.3

ROCK REVETMENT SURVEY - CHRISTCHURCH BAY

REFERENCE	COORDINATES	
	START	END

PHOTOGRAPHS	INSPECTOR	
1	DATE	
2	WEATHER	
3	TIDE	

DESCRIPTION	% (of structure)	tick
CONDITION 1		
major voids	<5%	
armour displacement	<5%	
settlement	<5% of length by < 0.2m	
Interlocking armour	>90%	
CONDITION 2		
major voids	5% - 10%	
armour displacement	5% - 10%	
Interlocking armour	>75%	
settlement	5% - 40% of length by < 0.5m	
CONDITION 3		
major voids	10% - 25%	
armour displacement	10% - 25%	
Interlocking armour	>50%	
settlement	40% - 60% by 0.5m - 1m	
CONDITION 4		
major voids	25% - 50%	
armour displacement	25% - 50%	
Interlocking armour >30%	>90%	
settlement	>60% by > 1m	
CONDITION 5		
Interlocking armour	<30%	
groyne failed	>50%	
OVERALL CONDITION		

DESCRIPTION OF ASSET	
DATE CONSTRUCTED	
DIMENSIONS (m)	ELEVATION (m OD)
ARMOUR SIZE / TYPE	
SPECIFIC DESCRIPTION	
OVERALL ASSESSMENT	
MAINTENANCE REQUIRED	
RESIDUAL LIFE (yrs)	

Table A.4

SEAWALL SURVEY - CHRISTCHURCH BAY

REFERENCE	COORDINATES	
	START	END

PHOTOGRAPHS		INSPECTOR	
1		DATE	
2		WEATHER	
3		TIDE	

DESCRIPTION	(tick)	% (of structure)
CONDITION 1		
hairline cracks		
surface cavities		
CONDITION 2		
sealant loss		
rust staining		
flaking / spalling		
CONDITION 3		
exposure of reinforcement		
lengthy cracks		
minor movement		
CONDITION 4		
extensive spalling		
major movement		
leakage		
CONDITION 5		
structural failure		
considerable thickness loss		
loss of reinforcement		
OVERALL CONDITION		

DESCRIPTION OF ASSET	
DATE CONSTRUCTED	
DIMENSIONS (m)	ELEVATION (m OD)

CONSTRUCTION MATERIALS

SPECIFIC DESCRIPTION

OVERALL ASSESSMENT

MAINTENANCE REQUIRED

RESIDUAL LIFE (yrs)	

Table A.5

Annex B: Asset Condition Summaries

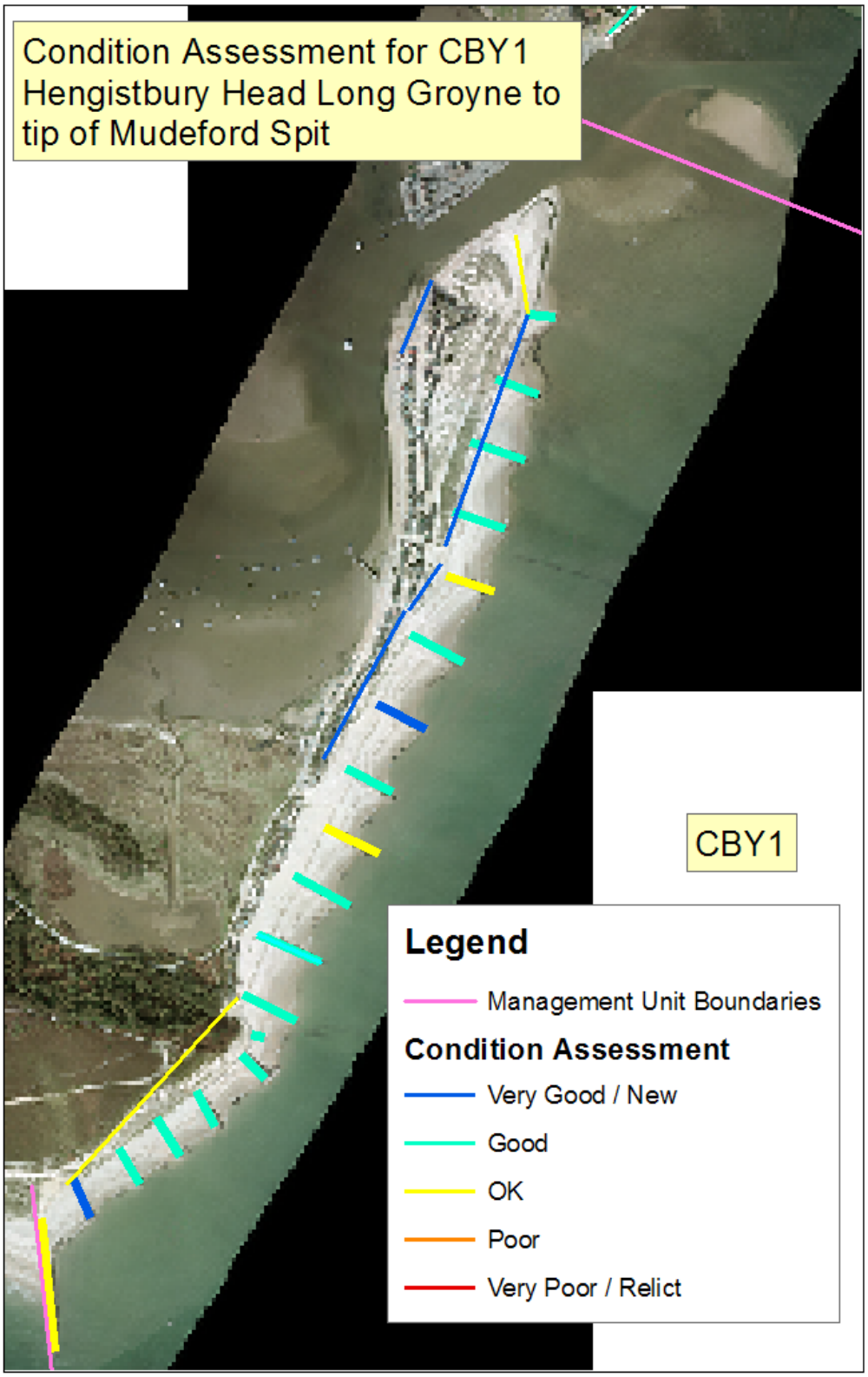

Condition Assessment for CBY1 Hengistbury Head Long Groyne to tip of Mudeford Spit
CBY1
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict

Figure B.1

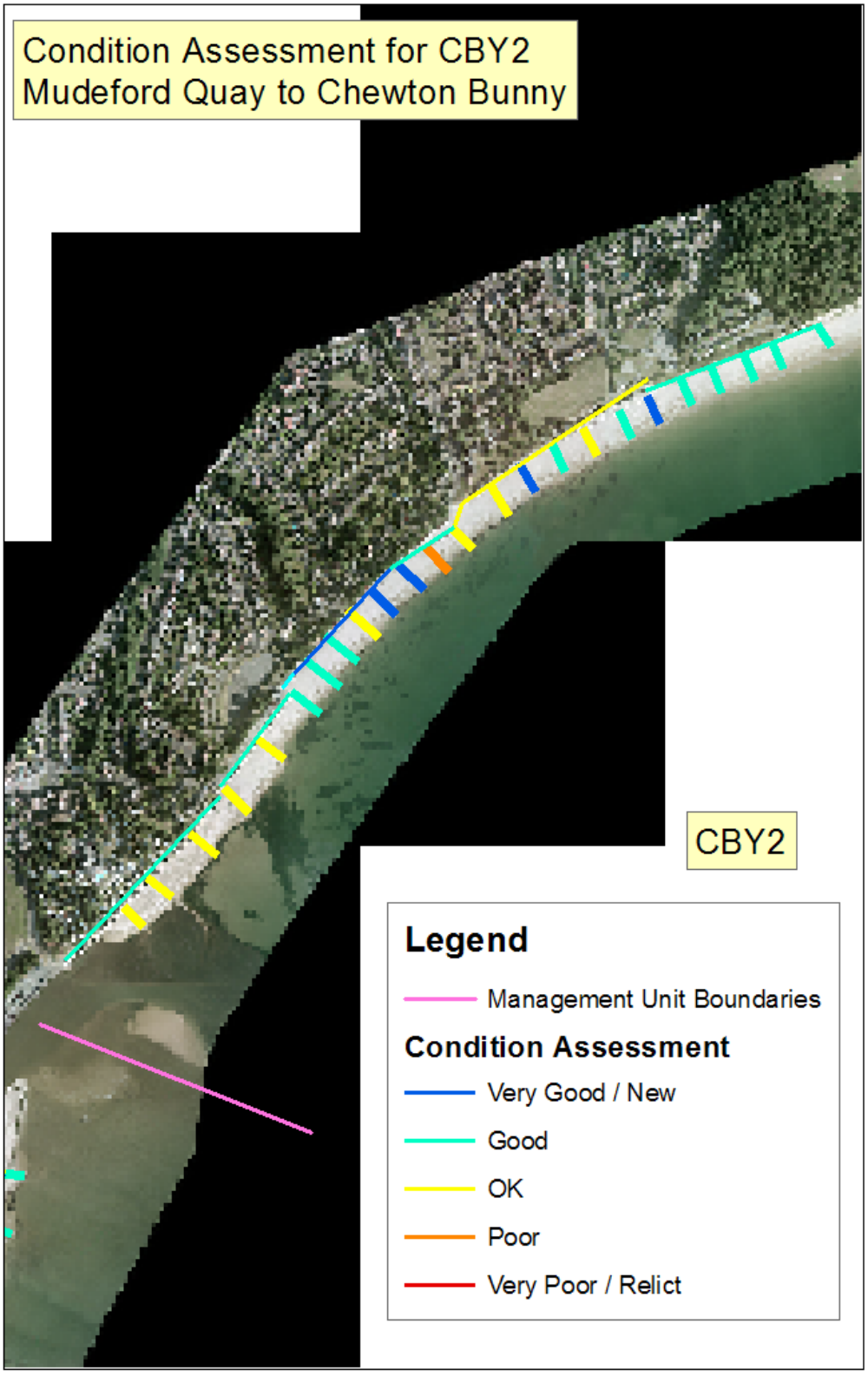

Condition Assessment for CBY2
Mudeford Quay to Chewton Bunny
CBY2
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict

Figure B.2

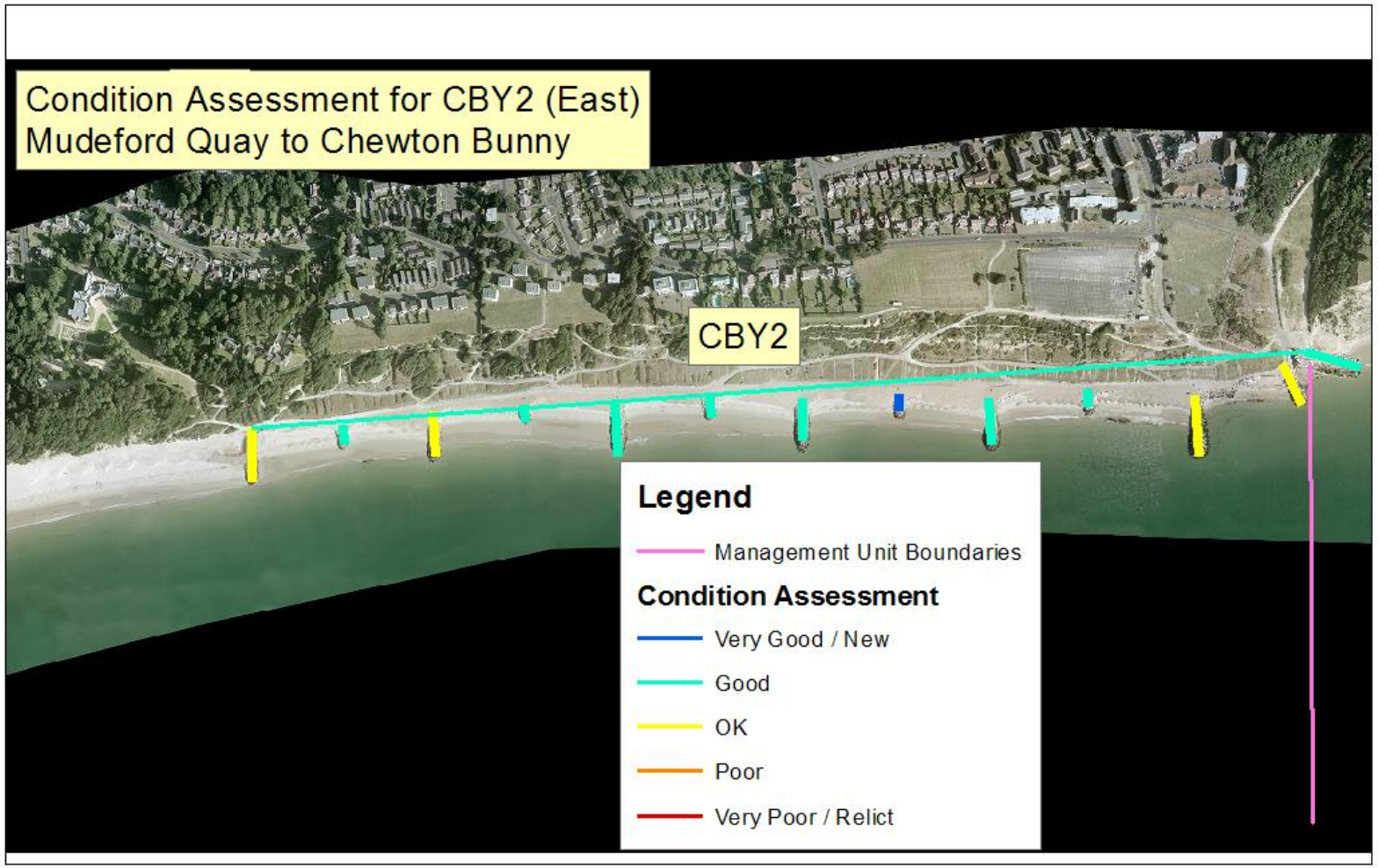

Condition Assessment for CBY2 (East)
Mudeford Quay to Chewton Bunny
CBY2
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict

Figure B.3

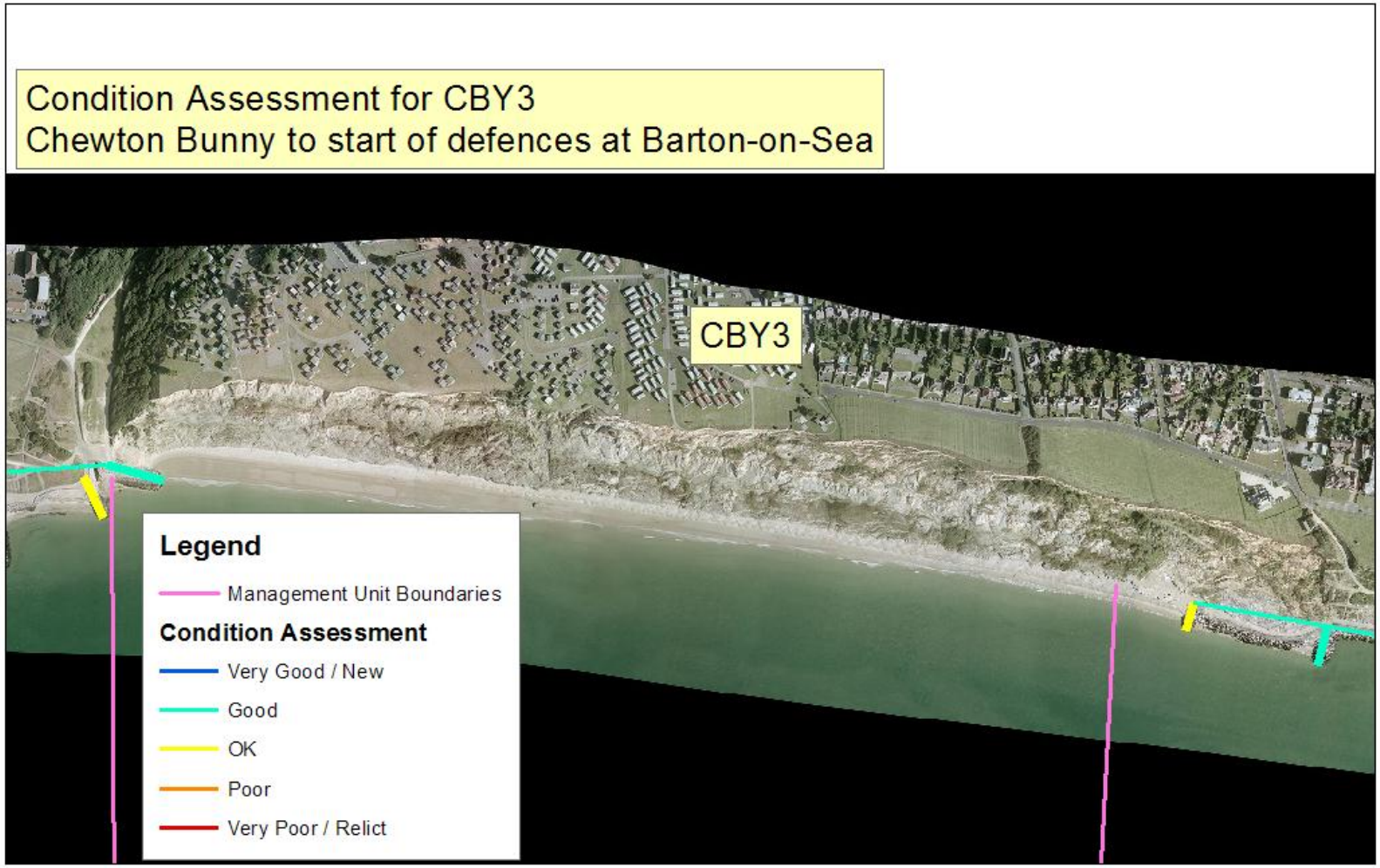

Condition Assessment for CBY3
Chewton Bunny to start of defences at Barton-on-Sea
CBY3
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict

Figure B.4

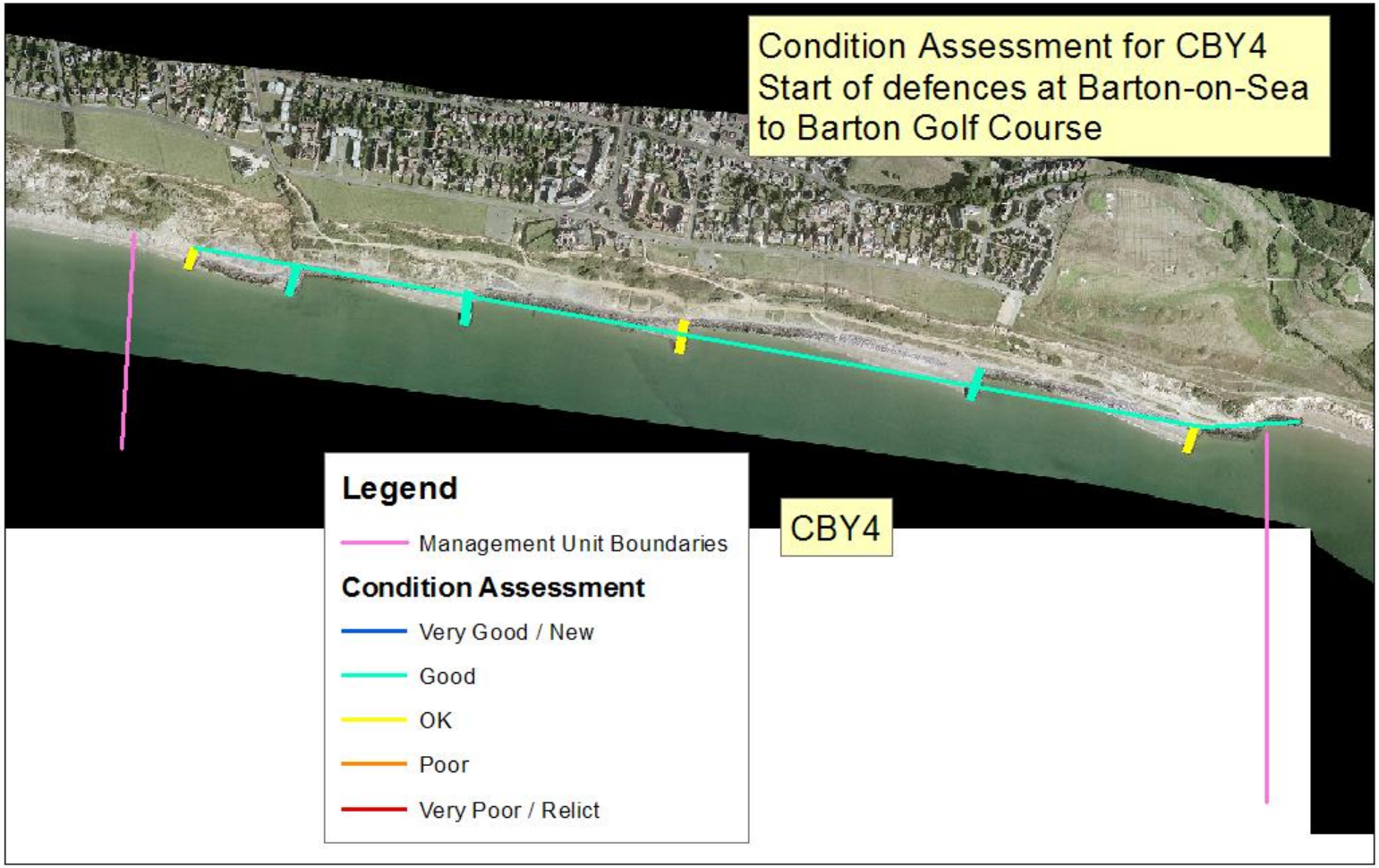

Condition Assessment for CBY4
Start of defences at Barton-on-Sea
to Barton Golf Course
CBY4
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict

Figure B.5

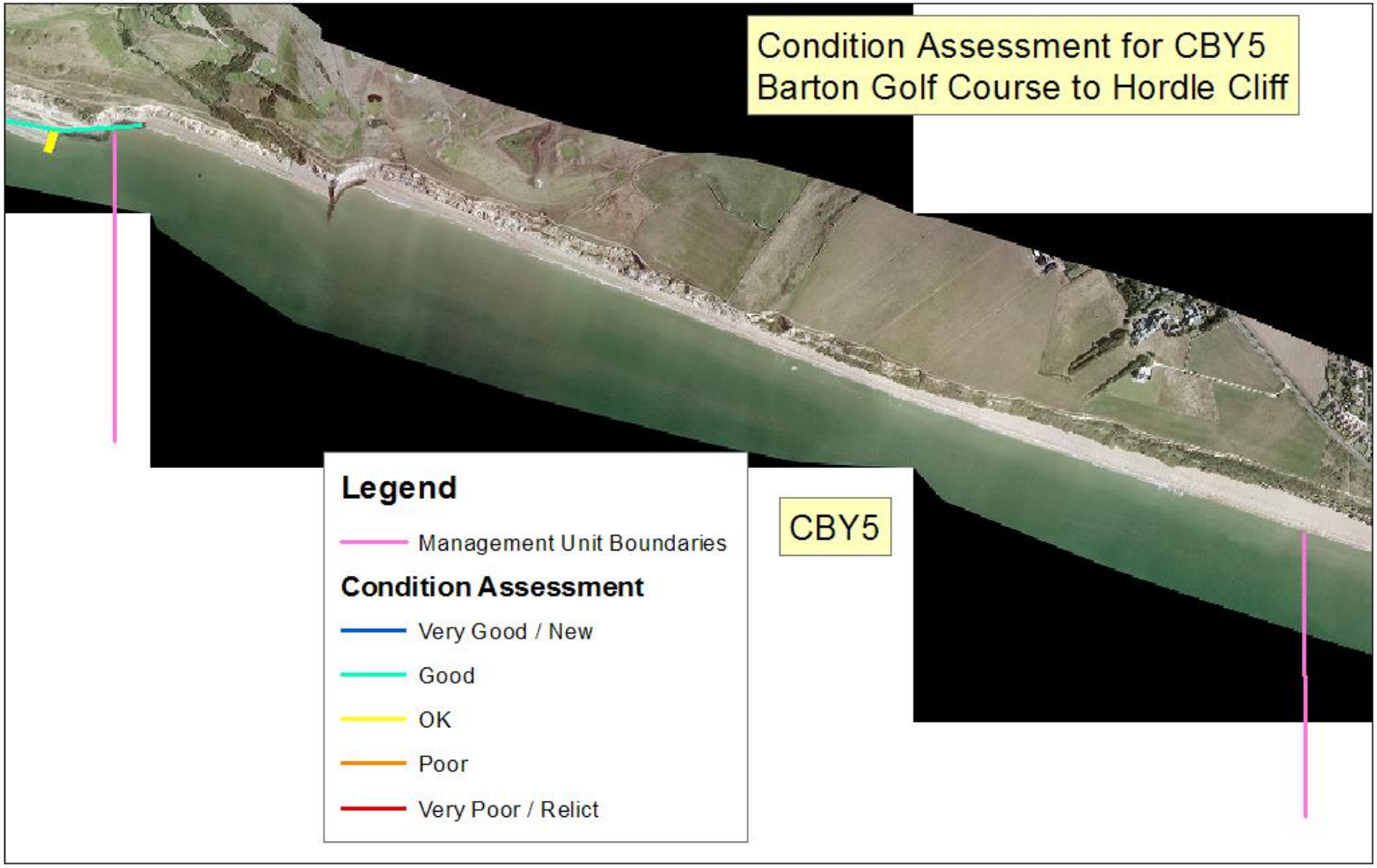

Condition Assessment for CBY5
Barton Golf Course to Hordle Cliff
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict
CBY5

Figure B.6

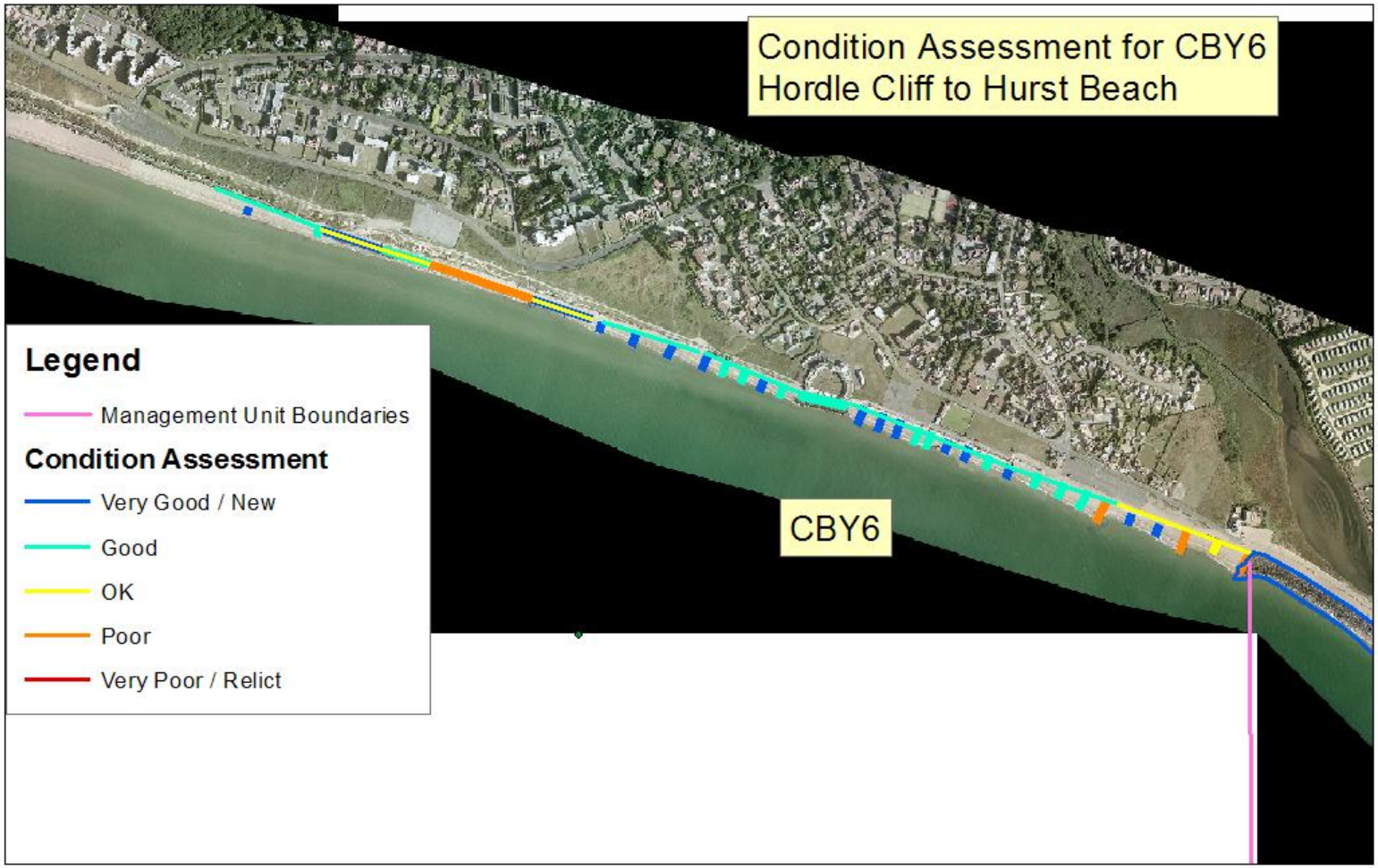

Condition Assessment for CBY6
Hordle Cliff to Hurst Beach
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict
CBY6

Figure B.7

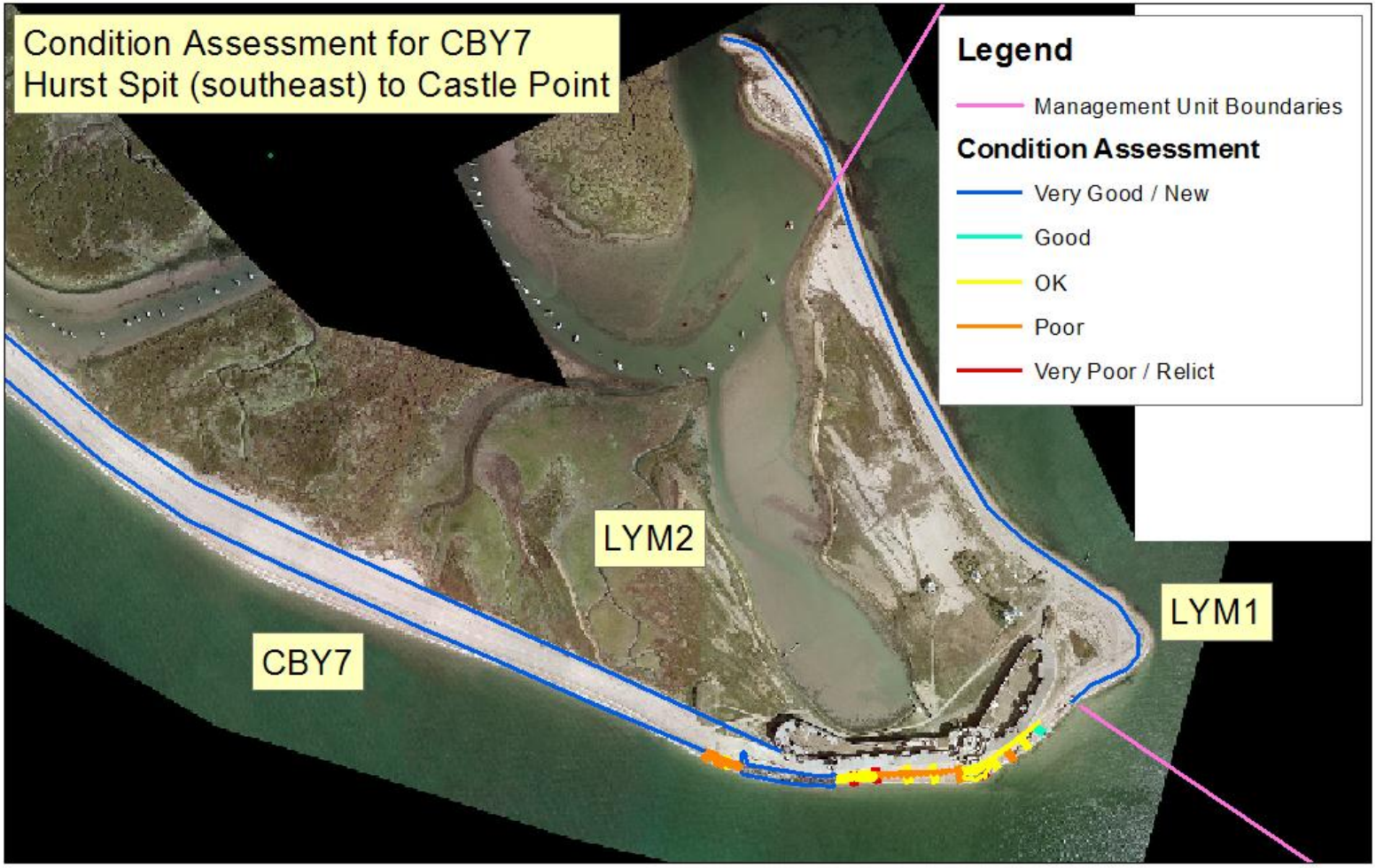

Condition Assessment for CBY7
Hurst Spit (southeast) to Castle Point
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict
LYM2
LYM1
CBY7

Figure B.8

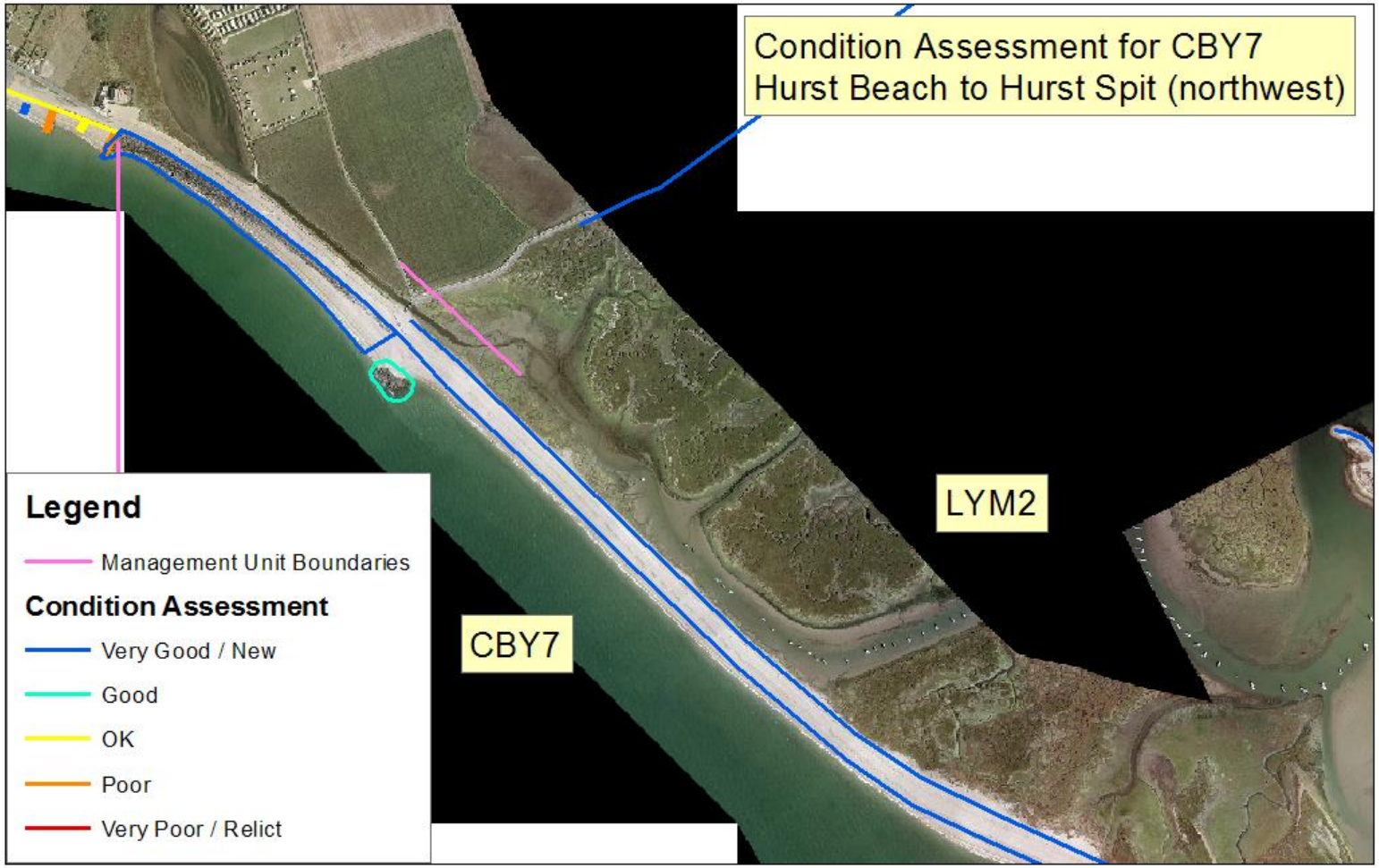

Condition Assessment for CBY7
Hurst Beach to Hurst Spit (northwest)
LYM2
CBY7
Legend
Management Unit Boundaries
Condition Assessment
Very Good / New
Good
OK
Poor
Very Poor / Relict

Figure B.9

Inspection date	LOCATION	SMP Ref Code	NFCDD Ref Code								ALONG-SHORE DEFENCE	CONDITION	Residual Life		CROSS-SHORE STRUCTURE	CONDITION	MATERIAL (HW - hardwood) (SW - softwood)	Residual Life	
			REGION	COUNTY	Sub Area	Watercourse	Reach	Sub Reach	Defence	Structure			(years)	Expiry Date (along-shore)				(years)	Expiry Date (cross-shore)
	LYM3 / LYM2 BOUNDARY																		
20/05/2004	Hurst Beach	LYM2	7	1	EC	R904	12	1	C01		beach	1					mixed sand / shingle		
	LYM2 / LYM1 BOUNDARY																		
20/05/2004	North Point	LYM1	7	1	EC	R904	13	1	C01		beach	1					mixed sand / shingle		
	LYM1 / CBT7 BOUNDARY																		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C01		rock / timber	3	20	2023			1-4T Portland /		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C01		revetment	3	20	2023			HW piles & boards		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C01	001		3	20	2023	groyne	2	HW piles & boards	25	2028
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C01	002		3	20	2023	groyne	3	HW piles & boards	20	2023
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C01	003		3	20	2023	groyne	4	HW piles & boards	5	2008
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C02		seawall /	3	20	2023			Portland stone block / piling		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C02		rock / timber	3	20	2023			1-4T Portland /		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C02		revetment	3	20	2023			HW piles & boards		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C02	001		3	20	2023	groyne	3	HW piles & boards	20	2023
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C02	002		4	5	2008	groyne	5	HW piles & boards	1	2004
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C03		rock / timber	4	10	2013			1-3T Portland /		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C03		revetment	4	5	2008			HW piles & boards		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C03	001		4	5	2008	groyne	4	HW piles & boards	5	2008
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C03	002		4	5	2008	groyne	3	HW piles & boards	20	2023
20/07/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C03	003		4	5	2008	groyne	3	HW piles & boards	20	2023
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C04		rock / timber	3	20	2023			2-5T Portland /		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C04		revetment	3	20	2023			HW piles & boards		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C04	001		3	20	2023	groyne	5	derelict HW piles & boards	1	2004
20/07/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C04	002		3	20	2023	groyne	5	derelict HW piles & boards	1	2004
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C05		rock	1	50	2053			3-6T Mendip Rock armour		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C05		revetment	1	50	2053					
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C06		rock / timber	4	10	2013			1-4T Portland /		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C06		revetment	4	5	2008			HW piles & boards		
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C06	001		4	5	2008	groyne	3	HW piles & boards	20	2023
20/05/2004	Hurst Castle	BAR6	7	1	EF	R905	01	1	C06	002		4	5	2008	groyne	4	HW piles & boards	4	2007
20/05/2004	Hurst Beach	BAR6	7	1	EF	R905	01	1	C07		beach	1					mixed sand / shingle		
20/05/2004	Hurst Beach	BAR6	7	1	EF	R905	01	1	C08		breakwater	2	35	2038			6-10T rock armour		
20/05/2004	Hurst Beach	BAR6	7	1	EF	R905	01	1	C09		revetment	1	50	2053			3-6T rock armour		
	CBT7 / CBT6 BOUNDARY																		
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C01		seawall	3	10	2014			concrete wave return		
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C01	001		3	10	2014	strongpoint	4	2-4T Portland limestone	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C01	002		3	10	2014	groyne	3	HW piles & boards / concrete block	3	2007
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C01	003		3	10	2014	strongpoint	4	2-4T Portland limestone	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C01	004		3	10		groyne	1	HW piles & boards	10	
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C01	005		3	10		groyne	1	HW piles & boards	10	

Inspection date	LOCATION	SMP Ref Code	NFCDD Ref Code								ALONG-SHORE DEFENCE	CONDITION	Residual Life		CROSS-SHORE STRUCTURE	CONDITION	MATERIAL (HW - hardwood) (SW - softwood)	Residual Life	
			REGION	COUNTY	Sub Area	Watercourse	Reach	Sub Reach	Defence	Structure			(years)	Expiry Date (along-shore)				(years)	Expiry Date (cross-shore)
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C03	001		2	20	2024	strongpoint	4	2-4T Portland limestone	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C03	002		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C03	003		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C03	004		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C03	005	↓	2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	**Milford-on-Sea**	**CBY6**	**7**	**1**	**EF**	**R905**	**02**	**1**	**C04**		**seawall**	2	20	2024			**concrete retaining wall**		
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	001		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	002		2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	003		2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	004		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	005		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	006		2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	007		2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C04	008	↓	2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	**Milford-on-Sea**	**CBY6**	**7**	**1**	**EF**	**R905**	**02**	**1**	**C05**		**seawall**	2	20	2024	**revetment**		**concrete retaining wall**		
											↓	2	20	2024	↓	2	**Mendip limestone revetment**		
01/08/2003	**Milford-on-Sea**	**CBY6**	**7**	**1**	**EF**	**R905**	**02**	**1**	**C06**		**seawall**	2	20	2024			**concrete retaining**		
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C06	001		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C06	002		2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C06	003		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C06	004		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C06	005	↓	2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	**Milford-on-Sea**	**CBY6**	**7**	**1**	**EF**	**R905**	**02**	**1**	**C07**		**seawall**	2	20	2024			**concrete retaining wall**		
01/08/2003	**Milford-on-Sea**	**CBY6**	**7**	**1**	**EF**	**R905**	**02**	**1**	**C08**		**seawall**	2	20	2024			**concrete retaining wall**		
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C08	001		2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C08	002		2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C08	003	↓	2	20	2024	groyne	1	HW piles & boards	10	2014
01/08/2003	**Milford-on-Sea**	**CBY6**	**7**	**1**	**EF**	**R905**	**02**	**1**	**C09**		**seawall**	3	10	2014	**revetment**	1	**concrete retaining wall 3-6T Mendip limestone**	30	2034
												4	5	2009		4	**concrete retaining wall 1-4 T Portland limestone**	5	2009
												3	10	2014		2	**concrete retaining wall 3-6T Mendip limestone**	20	2024
											↓	3	10	2014	↓	1	**concrete retaining wall 3-6T Mendip limestone**	30	2034
01/08/2003	**Milford-on-Sea**	**CBY6**	**7**	**1**	**EF**	**R905**	**02**	**1**	**C10**		**seawall**	2	20	2024					
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C10	001		2	20	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Milford-on-Sea	CBY6	7	1	EF	R905	02	1	C10	002	↓	2	20	2024	groyne	1	HW piles & boards	10	2014
07/01/1900	**CBY6 / CBY5 BOUNDARY**																		
01/08/2003	**Hordle Cliffs**	**CBY5**	**7**	**1**	**EF**	**R905**	**03**	**1**	**C01**		**beach**						**mixed sand / shingle**		
	CBY5 / CBY4 BOUNDARY																		
01/08/2003	**Barton-on-Sea**	**CBY4**	**7**	**1**	**EF**	**R905**	**04**	**1**	**C01**		**revetment**	2	20	2024			**3-6T Mendip limestone**		

Inspection date	LOCATION	SMP Ref Code	NFCDD Ref Code								ALONG-SHORE DEFENCE	CONDITION	Residual Life		CROSS-SHORE STRUCTURE	CONDITION	MATERIAL (HW - hardwood) (SW - softwood)	Residual Life	
			REGION	COUNTY	Sub Area	Watercourse	Reach	Sub Reach	Defence	Structure			(years)	Expiry Date (along-shore)				(years)	Expiry Date (cross-shore)
01/08/2003	**Barton-on-Sea**	**CBY4**	**7**	**1**	**EF**	**R905**	**04**	**1**	**C02**		**revetment**	**2**	**20**	2024			**3-6T Mendip limestone**		
01/08/2003	Barton-on-Sea	CBY4	7	1	EF	R905	04	1	C02	001		**2**	**20**	2024	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	Barton-on-Sea	CBY4	7	1	EF	R905	04	1	C02	002		**3**	**10**	2014	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Barton-on-Sea	CBY4	7	1	EF	R905	04	1	C02	003		**2**	**20**	2024	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	Barton-on-Sea	CBY4	7	1	EF	R905	04	1	C02	004		**2**	**20**	2024	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Barton-on-Sea	CBY4	7	1	EF	R905	04	1	C02	005		**1**	**50**	2054	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Barton-on-Sea	CBY4	7	1	EF	R905	04	1	C02	006	▼	**4**	**5**	2009	strongpoint	3	2-4T Portland limestone	10	2014
	CBY4 / CBY3 BOUNDART																		
01/08/2003	**Naish**	**CBY3**	**7**	**1**	**EF**	**R905**	**05**	**1**	**C01**		**beach**						**mixed sand / shingle**		
	CBY3 / CBY2 BOUNDART																		
01/08/2003	**Highcliffe**	**CBY2**	**7**	**1**		**R906**	**06**	**1**	**C01**		**beach /**	**2**	**15**	2019			**2-4T Portland limestone**		
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	001	**buried**	**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	002	**revetment**	**2**	**15**	2019	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	003		**2**	**15**	2019	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	004		**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	005		**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	006		**2**	**15**	2019	strongpoint	1	2-4T Portland limestone	20	2024
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	007		**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	008		**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	009		**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	010		**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	011		**2**	**15**	2019	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	012		**2**	**15**	2019	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Highcliffe	CBY2	7	1		R906	06	1	C01	013	▼	**2**	**15**	2019	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	**Highcliffe Castle**	**CBY2**	**7**	**1**		**R906**	**06**	**1**	**C02**		**beach**						**mixed sand / shingle**		
01/08/2003	**Steamer Point**	**CBY2**	**7**	**1**		**R906**	**06**	**1**	**C03**		**seawall**	**2**	**20**	2024			**concrete wave return**		
01/08/2003	Steamer Point	CBY2	7	1		R906	06	1	C03	001		**2**	**20**	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Steamer Point	CBY2	7	1		R906	06	1	C03	002		**2**	**20**	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Steamer Point	CBY2	7	1		R906	06	1	C03	003		**2**	**20**	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Steamer Point	CBY2	7	1		R906	06	1	C03	004		**2**	**20**	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	Steamer Point	CBY2	7	1		R906	06	1	C03	005	▼	**2**	**20**	2024	groyne	2	HW piles & boards	5	2009
01/08/2003	**Avon Beach**	**CBY2**	**7**	**1**		**R906**	**06**	**1**	**C04**		**seawall**	**3**	**10**	2014			**concrete wave return**		
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C04	001		**3**	**10**	2014	groyne	1	HW piles & boards	10	2014
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C04	002		**3**	**10**	2014	groyne	2	HW piles & boards	5	2009
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C04	003		**3**	**10**	2014	groyne	3	HW piles & boards	3	2007
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C04	004		**3**	**10**	2014	groyne	2	HW piles & boards	5	2009
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C04	005		**3**	**10**	2014	groyne	1	HW piles & boards	10	2014
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C04	006	▼	**3**	**10**	2014	groyne	3	HW piles & boards	3	2007
01/08/2003	**Avon Beach**	**CBY2**	**7**	**1**		**R906**	**06**	**1**	**C05**		**seawall**	**3**	**10**	2014			**concrete wave return**		
01/08/2003	**Avon Beach**	**CBY2**	**7**	**1**		**R906**	**06**	**1**	**C06**		**seawall**	**2**	**20**	2024			**concrete wave return**		
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C06	001		**2**	**20**	2024	groyne	3	HW piles & boards	3	2007
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C06	002		**2**	**20**	2024	groyne	4	HW piles & boards	2	2006
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C06	003	▼	**2**	**20**	2024	groyne	1	HW piles & boards	10	2014

Inspection date	LOCATION	SMP Ref Code	NFCDD Ref Code								ALONG-SHORE DEFENCE	CONDITION	Residual Life		CROSS-SHORE STRUCTURE	CONDITION	MATERIAL (HV - hardwood) (SV - softwood)	Residual Life	
			REGION	COUNTY	Sub Area	Watercourse	Reach	Sub Reach	Defence	Structure			(years)	Expiry Date (along-shore)				(years)	Expiry Date (cross-shore)
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C07		seawall	1	30	2034			concrete wave return		
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C07	001		1	30	2034	groyne	1	HV piles & boards	10	2014
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C07	002		1	30	2034	groyne	3	HV piles & boards	3	2007
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C07	003		1	30	2034	groyne	2	HV piles & boards	5	2009
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C07	004		1	30	2034	groyne	2	HV piles & boards	5	2009
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C08		seawall	2	20	2024			concrete wave return		
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C09		seawall	2	20	2024			concrete wave return		
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C09	001		2	20	2024	groyne	2	HV piles & boards	15	2019
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C09	002		2	20	2024	groyne	3	HV piles & boards	10	2014
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C09	003		2	20	2024	groyne	3	HV piles & boards	10	2014
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C10		seawall	2	20	2024			concrete wave return		
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C10	001		2	20	2024	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C10	002		2	20	2024	strongpoint	3	2-4T Portland limestone	10	2014
01/08/2003	Avon Beach	CBY2	7	1		R906	06	1	C10	003		2	20	2024	strongpoint	3	2-4T Portland limestone	10	2014
07/01/1900	CBY2 / CBY1 BOUNDARY																		
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C01		revetment	1	20	2024			1-3T Portland limestone		
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C02		revetment	3	10	2014			1-3T Portland limestone		
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C03		revetment	1	20	2024			1-3T Portland limestone		
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C02	001		3	10	2014	strongpoint	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C03	002		1	20	2024	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C03	003		1	20	2024	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C03	004		1	20	2024	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C04		revetment	1	10	2014			wooden revetment		
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C04	001		1	10	2014	groyne	3	2-4T Portland limestone	10	2014
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C05		revetment	1	30	2034			concrete retaining		
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C05	001		1	30	2034	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C05	002		1	30	2034	groyne	1	2-4T Portland limestone	20	2024
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C06		beach						Sand		
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C06	001					groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C06	002					groyne	3	2-4T Portland limestone	10	2014
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C06	003					groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C06	004					groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Christchurch Sandspit	CBY1	7	1		R906	07	1	C06	005					groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07		revetment	3	10	2014			1-3T Portland limestone		
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07	001		3	10	2014	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07	002		3	10	2014	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07	003		3	10	2014	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07	004		3	10	2014	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07	005		3	10	2014	groyne	2	2-4T Portland limestone	15	2019
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07	006		3	10	2014	groyne	1	2-4T Portland limestone	20	2024
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07		beach						Sand		
01/08/2003	Hengistbury Head	CBY1	7	1		R906	07	1	C07	001					groyne	3	2-4T Portland limestone	10	2014

Annex C: Asset Condition Summary per Management Unit

C1 Strategic Management Unit CBY1 A&B

	Plate C1.1 Looking south, view of concrete revetment on west side of beach frontage
	Plate C1.2 Looking south, view of wooden revetment on eastern side of dunes
	Plate C1.3 Looking south, view of rock groynes at the southern end of Mudeford Spit
	Plate C1.4 Looking south, view of rock groyne, Mudeford Spit

Boundaries of Management Unit	Hengistbury Long Groyne to tip of Mudeford Sandbank
Total frontage length (m)	1860
Defended frontage length (m)	1860
Current SMP policy	Hold the Existing Defence Line
Current beach condition	Beach recycling programme in operation Stable sand spit, profile maintained through maintenance No change or slight erosion in cross-sectional area No change in MHW contour position Seaward face dynamic and mobile Hengistbury Head shelters Spit from prevailing south westerly waves
Existing Management Schemes	Mudeford Sandbank Management Plan details the maintenance of the entire spit for a 50-year period
Along Shore Defences	There are 6 sections of along-shore defence: 5 sections are comprised of Portland limestone revetment, comprising 1-3 ton rock units, with a residual life ranging from 10 to 30 years There is 1 wooden revetment section, with a residual life of approximately 10 years
Cross Shore Structures	There are 19 cross-shore structures: All cross-shore structures are rock groynes constructed of 1-3 ton Portland limestone armour units with residual life values ranging from 10 to 20 years

Asset owned by	Christchurch Borough Council
Asset maintained by	Christchurch Borough Council
Hinterland	Mudeford Spit is a natural geomorphological feature that extends north/northeast from the eastern end of Hengistbury Head promontory The combination of the headland and spit provides protection to the towns of Christchurch and Mudeford, and the low-lying land bordering the shallow harbour and the banks of the Rivers Stour and Avon. To the east of the Spit is Christchurch Bay, with a dynamic shallow sandbank at its northern end; this is often exposed, and restricts navigation to a single channel (the 'Run') which experiences significant tidal current velocities. There are approximately 350 beach huts located on the spit
Health and Safety Issues	None identified
Current Maintenance Programme	As detailed in the Mudeford Sandbank Management Plan

C2 Strategic Management Unit CBY2

	Plate C2.2 Looking northeast, view of concrete seawall on Avon Beach
	Plate C2.2 Looking east, view of wooden groyne on Avon Beach
	Plate C2.3 Looking west, view of rock strong point on Highcliffe Beach

Boundaries of Management Unit	Mudeford Quay to Chewton Bunny
Total frontage length (m)	4489
Defended frontage length (m)	3804
Current SMP policy	Hold the Existing Defence Line
Current beach condition	Stable sand and shingle beach No change or slight erosion in cross-sectional area No change in MHW contour position Seaward face dynamic and mobile Spit sheltered from prevailing south westerly waves by Hengistbury Head
Existing Management Schemes	
Along Shore Defences	There are 9 sections of along-shore defence: 8 defence sections are comprised of concrete wave return walls, protecting low cliffs, with a residual life ranging from 10 to 30 years 1 section is comprised of a Portland limestone rock revetment consisting of 1-3 ton rock units with a residual life of 15 years The central section of the unit (Highcliffe Castle area) is undefended
Cross Shore Structures	There are 37 cross-shore structures: 16 of the structures exist as strongpoints composed of units of 1 to 4 ton Portland rock and have residual life ranging from 15 to 20 years 21 structures are comprised of hardwood piles and boards that are being progressively replacing with 1-2 ton Portland rock units and have a residual life of between 10 & 30 years
Asset owned by	Christchurch Borough Council
Asset maintained by	Christchurch Borough Council
Hinterland	The area around Mudeford Quay is low–lying whilst the remainder of this frontage is cliffed and includes the settlements of Highcliffe and Friars Cliff Chewton Bunny drainage stream is the boundary between CBY3 and 4
Health and Safety Issues	None identified
Current Maintenance Programme	Progressive replacement of timber groynes with rock groynes Rolling programme in place to maintain rock strongpoints

C3 Strategic Management Unit CBY3

Plate C3.1
Looking southwest, view of undefended frontage at Naish Farm

Boundaries of Management Unit	Chewton Bunny to western end of Barton-on-Sea defences
Total frontage length (m)	1270
Defended frontage length (m)	0
Current SMP policy	Managed Retreat
Current beach condition	Dynamic and mobile mixed shingle and sand beach
Existing Management Schemes	
Along Shore Defences	None
Cross Shore Structures	None
Asset owned by	Beach and cliffs - New Forest District Council
Asset maintained by	Beach and cliffs - New Forest District Council
Hinterland	The undefended, geologically important soft mud cliffs are approximately 30m in height. There is a Holiday Village (caravan and chalets) on the cliff top The cliffs respond rapidly to the groundwater levels following rainfall and storm wave events, exhibiting mass movement, seepage erosion, and rotational slumping
Health and Safety Issues	Potential hazard involving public accessing exposed soft cliff surface
Current Maintenance Programme	

C4 Strategic Management Unit CBY4

	Plate C4.1 Looking northeast, view of rock revetment and cliff stabilisation structures at Barton-on-Sea
	Plate C4.2 Looking east, view of rock revetment and groynes at Barton-on-Sea

Boundaries of Management Unit	Western end of Barton-on-Sea defences to Barton-on-Sea Golf Course
Total frontage length (m)	1887
Defended frontage length (m)	1887
Current SMP policy	Hold the Existing Defence Line
Current beach condition	Shingle and sand beaches of limited extent have formed within some groyne cells Results from analysis of beach profiles measured over the period 1989 to 2004 indicate that the beach width (from MLW contour position) has varied by 3 to 4m, and the beach slope trend over this period indicates slight steepening
Existing Management Schemes	
Along Shore Defences	There are 2 sections of along-shore defence: Both sections consist of Mendip limestone armour rock revetment comprised of 3-6 ton rock units which protect the toe of the cliff with a residual life ranging from 5 to 30 years
Cross Shore Structures	There are 6 cross-shore structures: All 6 structures are rock strongpoints comprised of 2-4 ton Mendip limestone rock units with residual life ranging from 10 to 15 years
Asset owned by	New Forest District Council
Asset maintained by	New Forest District Council
Hinterland	The majority of the residential and commercial properties are set back from the cliff edge behind a recreational area of grass and the cliff top highway. Due to continuing cliff erosion a number of properties are now located nearer to the cliff edge Extensive cliff stabilisation measures have been installed within this unit including re-profiling of the cliff slope and the installation of sheet pile cut-off walls and drainage. Much of these works have been affected by cliff movement and the process of erosion, as a result their functionality and performance is likely to have reduced in effectiveness
Health and Safety Issues	Access tracks have been closed between Sea Road and Hoskins Gap due to ground movement and there is the potential hazard associated with public accessing exposed soft cliff surface
Current Maintenance Programme	

C5 Strategic Management Unit CBY5

	Plate C5.1 Looking east, view of undefended frontage at Becton, east of Strong Point 25 at Barton-on-Sea
	Plate C5.2 Looking east, coastline to the east of Strong Point 25 at Barton-on-Sea

Boundaries of Management Unit	Barton Golf Course to Hordle Cliff
Total frontage length (m)	2461
Defended frontage length (m)	0
Current SMP policy	Do Nothing (observe and monitor)
Current beach condition	Generally stable wide, gently sloping shingle and sand beach, gently sloping to cliff toe Results from analysis of beach profiles measured over the period 1989 to 2004 indicate that the beach width (from MLW contour position) has varied by 6m, with an annual trend of beach cross-section area reduction. The beach slope trend over this period indicates no change
Existing Management Schemes	
Along Shore Defences	None
Cross Shore Structures	None
Asset owned by	Private Land Owners
Asset maintained by	Private Land Owners
Hinterland	The cliff top land is primary used for agriculture and golf course. The only development, located at the eastern end of the frontage, is set back from the cliffs near Milford The Becton Bunny outfall which is located to the west of the section has been protected with armourstone for the past 20years. The defence has acted in a similar manner to a groyne and has led to an increased amount of erosion to the east of the outfall, however the outfall was becoming outflanked due to cliff erosion. The bulk of the concrete cofferdam structure was removed in Autumn 2004 to be replaced by a submerged pipe to the west. Rock units still remains at the site of the original outfall
Health and Safety Issues	Access across/around Becton Bunny over existing rock Footpath repositioning following erosion of cliff
Current Maintenance Programme	

C6 Strategic Management Unit CBY6

	Plate C6.1 Looking west, view of wooden groynes and concrete seawall at Milford-on-Sea, together with concrete beach huts
	Plate C6.2 Looking west, view of concrete seawall and wooden groynes at Milford-on-Sea, together with timber beach huts

Boundaries of Management Unit	Hordle Cliff to Hurst Beach
Total frontage length (m)	2347
Defended frontage length (m)	2347
Current SMP policy	Hold the Existing Defence Line
Current beach condition	Dynamic shingle and sand beach Results from analysis of beach profiles measured between 1987 & 2004 indicate that the beach width (from MLW contour position) has varied by 13m, with an annual trend of beach cross-section area reduction. The beach slope trend over this period indicates no change
Existing Management Schemes	
Along Shore Defences	There are 11 sections of along-shore defence: 9 sections consist of sloping / vertical concrete seawalls with a residual life of between 5 to 20 years which offer protection to low cliffs. In addition there are 2 sections of rock revetment composed of a mixture of Mendip & Portland limestone rock unit which offer protection to the toe of the seawalls. The sections of revetment have a residual life ranging between 10 & 20 years
Cross Shore Structures	There are 27 cross-shore defences: 3 structures are constructed of Mendip and Portland limestone rock strongpoints with a residual life ranging between 5 & 30 years There are 24 hardwood pile and board groynes with a residual life ranging between 2 & 10 years
Asset owned by	New Forest District Council
Asset maintained by	New Forest District Council
Hinterland	The predominantly residential village of Milford-on-Sea is fronted by a strip of undeveloped open space and recreational land. There are soft cliffs to the west of the unit gradually reducing in elevation to the east The low-lying land to the west side of Sturt Pond is a flood risk area There are approximately 140 beach huts (concrete and timber) along this frontage
Health and Safety Issues	None identified
Current Maintenance Programme	Milford Promenade Improvements Works Groyne maintenance programme

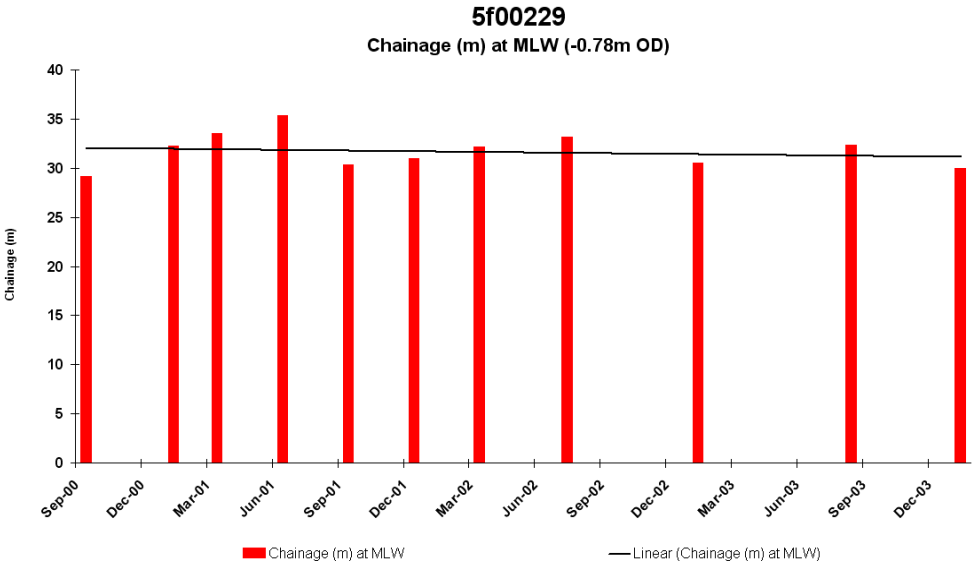
C7 Strategic Management Unit CBY7

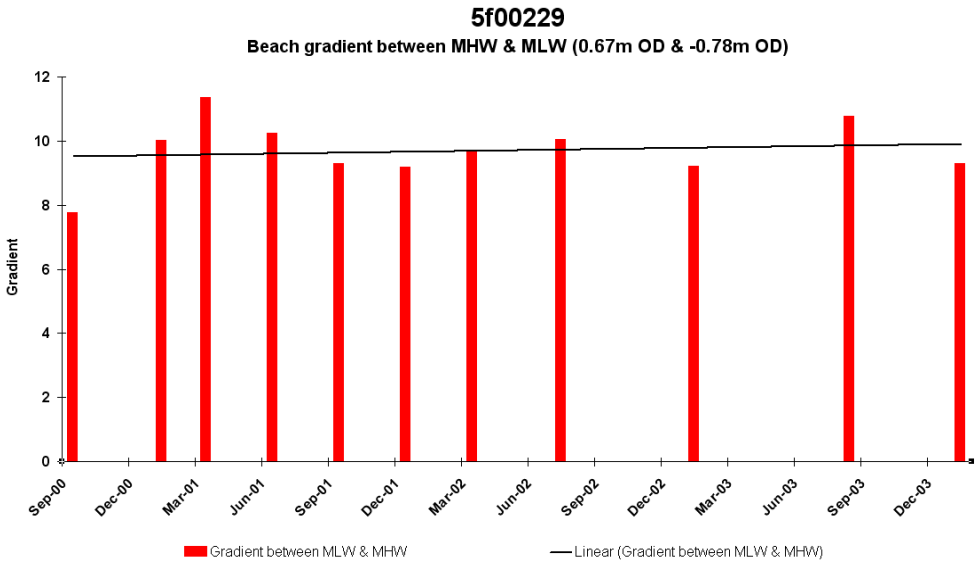
	Plate C7.1 Looking west, view of offshore rock breakwater, Hurst Spit
	Plate C7.2 Looking northeast, view of wooden revetment and groynes west of Hurst Castle, Hurst Spit
	Plate C7.3 Looking northwest, view of wooden groynes and rock revetment on south side of Hurst Castle, Hurst Spit

Strategic Management Unit	**CBY7**
Boundaries of Management Unit	Hurst Spit
Total frontage length (m)	2893
Defended frontage length (m)	2893
Current SMP policy	Hold the Existing Defence Line
Current beach condition	Shingle spit, profile managed through maintenance, and periodic recycling of shingle from tip of recurve (North Point) No change in cross-sectional area as the Spit is maintained No change in MHW contour position Seaward face experiences dynamic volumetric changes due to storm wave events and is therefore beach sediment is highly mobile Leeward face of the spit is stable
Existing Management Schemes	Hurst Spit Beach Management Plan details the maintenance of the entire spit for a 50-year period
Along Shore Defences	Hurst Castle receives protection from a mixture of defences including hardwood pile and board revetments with residual life ranging from 5 to 20 years, and Mendip armour and Portland limestone rock revetments with residual life ranging from 10 to 50 years At the foot of the Spit an offshore breakwater and 400m section of revetment, each with a residual life of 50 years, were constructed in 1996 comprising Norwegian Larvic 6-10 ton and 3-6 ton rock units, respectively
Cross Shore Structures	In addition to the defences described above the castle also receives protection from hardwood pile and board groynes with residual life of 1 to 25 years
Hinterland	Christchurch Bay is to the south and west of Hurst Spit, with Hurst Narrows immediately offshore of Hurst Castle. The Spit protects the entire West Solent In the lee of the Spit (the eastern side) is the Keyhaven estuary, containing saltmarshes, inter-tidal mudflats and creek/channel networks
Health and Safety Issues	None identified
Current Maintenance Programme	As detailed in the Hurst Spit Beach Management Plan

Appendix D: Beach Profile Analysis

CBY2


5f00229
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
40
35
30
25
20
15
10
5
0
Sep-00
Dec-00
Mar-01
Jun-01
Sep-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00229
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
12
10
8
6
4
2
0
Sep-00
Dec-00
Mar-01
Jun-01
Sep-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

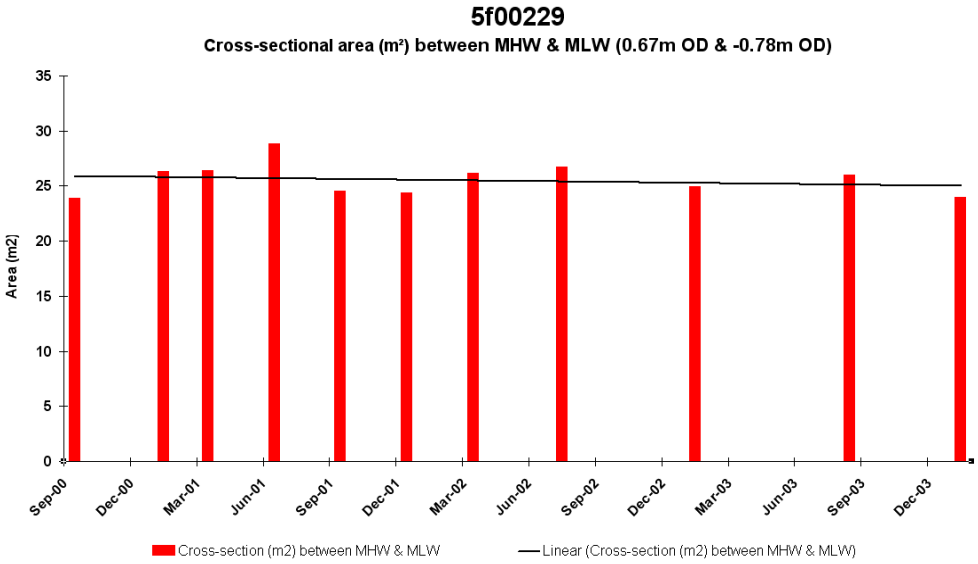
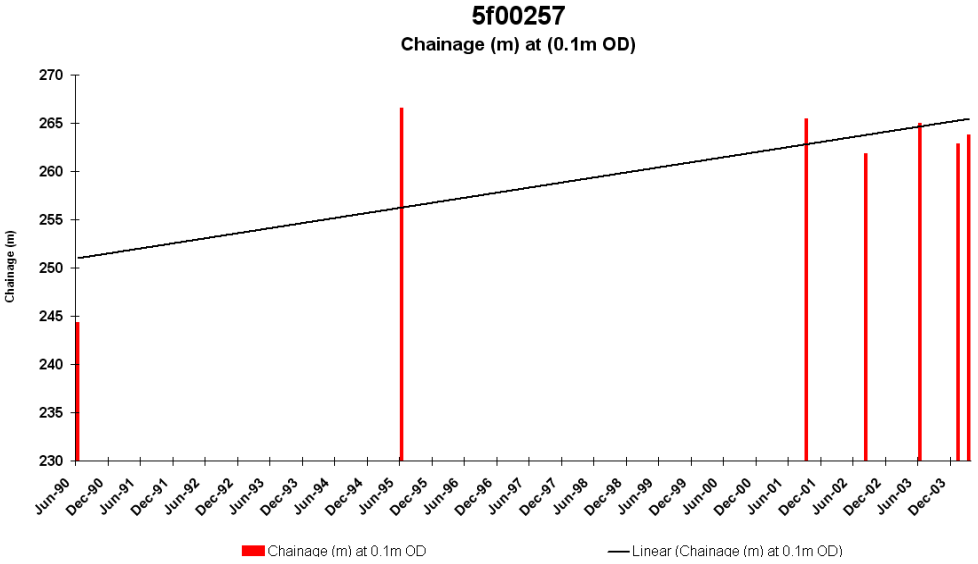


Figure D1.1 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00229



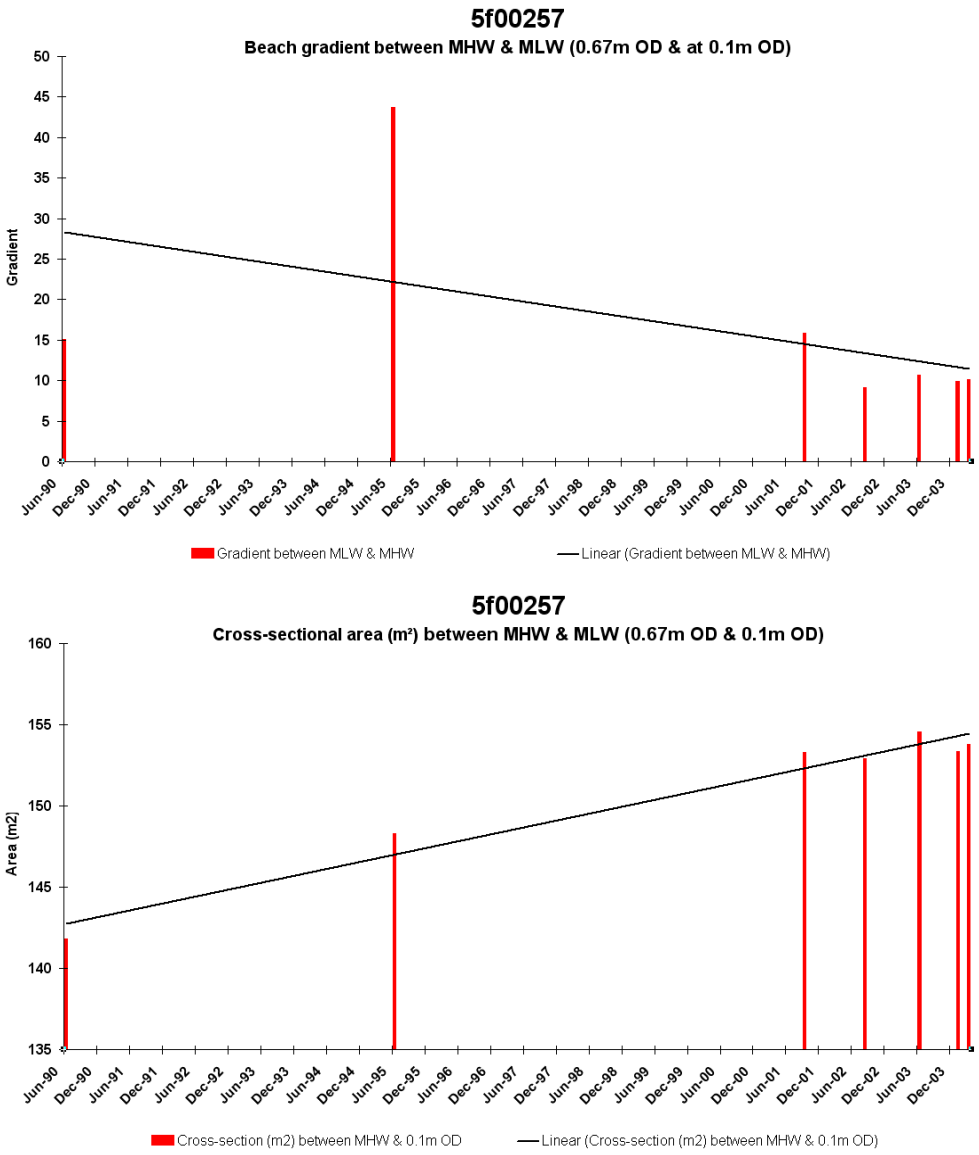
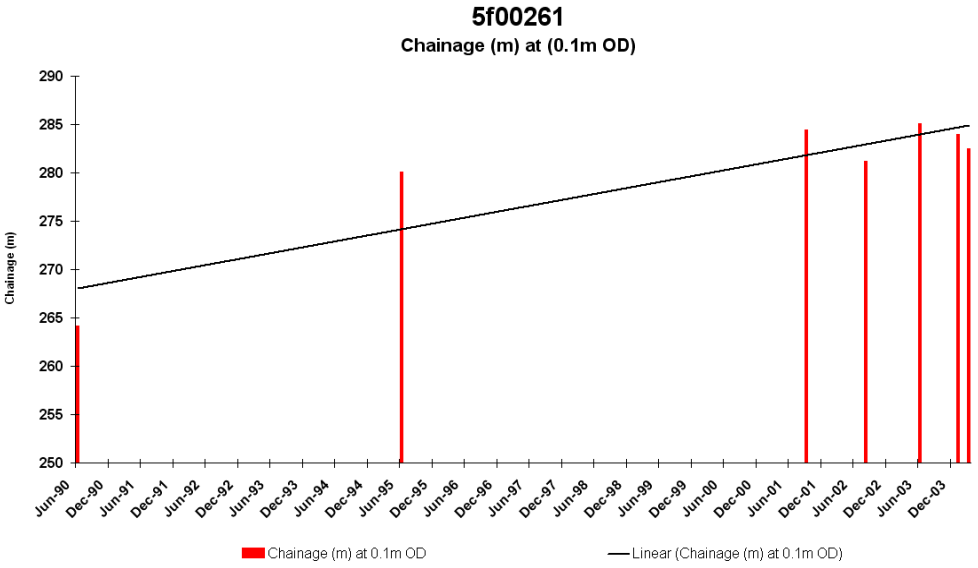
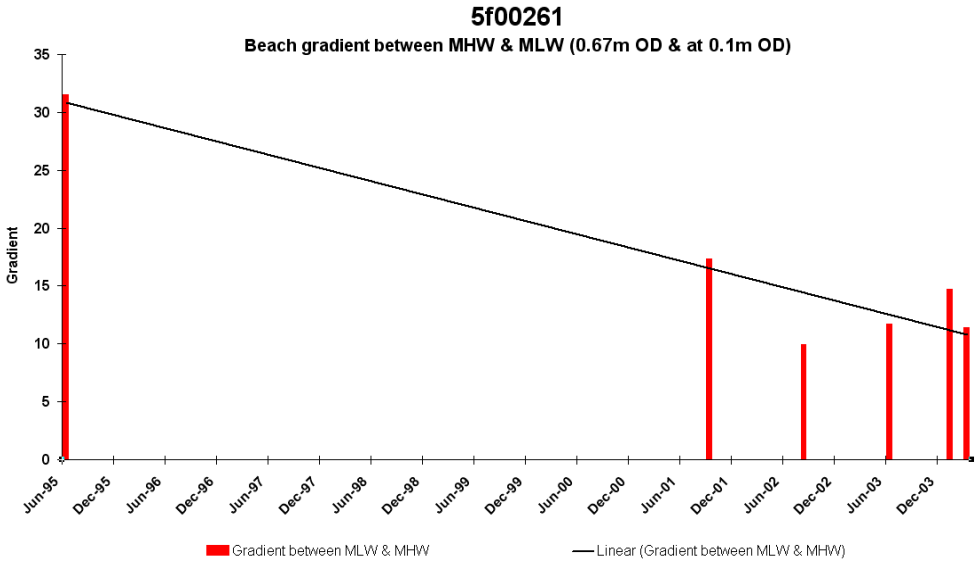


Figure D1.2 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00257


5f00261
Chainage (m) at (0.1m OD)
Chainage (m)
290
285
280
275
270
265
260
255
250
Jun-90
Dec-90
Jun-91
Dec-91
Jun-92
Dec-92
Jun-93
Dec-93
Jun-94
Dec-94
Jun-95
Dec-95
Jun-96
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
Jun-00
Dec-00
Jun-01
Dec-01
Jun-02
Dec-02
Jun-03
Dec-03
Chainage (m) at 0.1m OD
Linear (Chainage (m) at 0.1m OD)


5f00261
Beach gradient between MHW & MLW (0.67m OD & at 0.1m OD)
Gradient
35
30
25
20
15
10
5
0
Jun-95
Dec-95
Jun-96
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
Jun-00
Dec-00
Jun-01
Dec-01
Jun-02
Dec-02
Jun-03
Dec-03
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

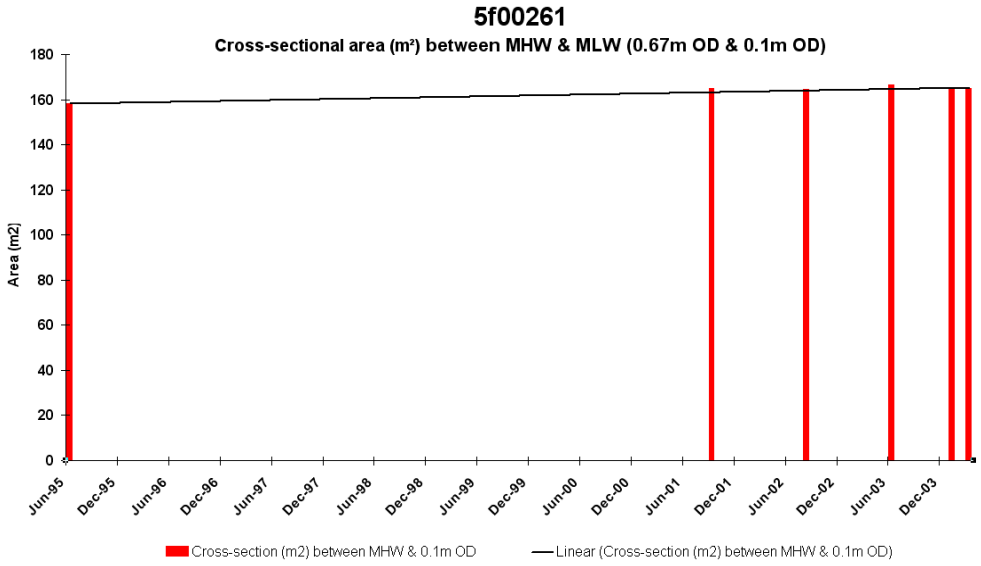
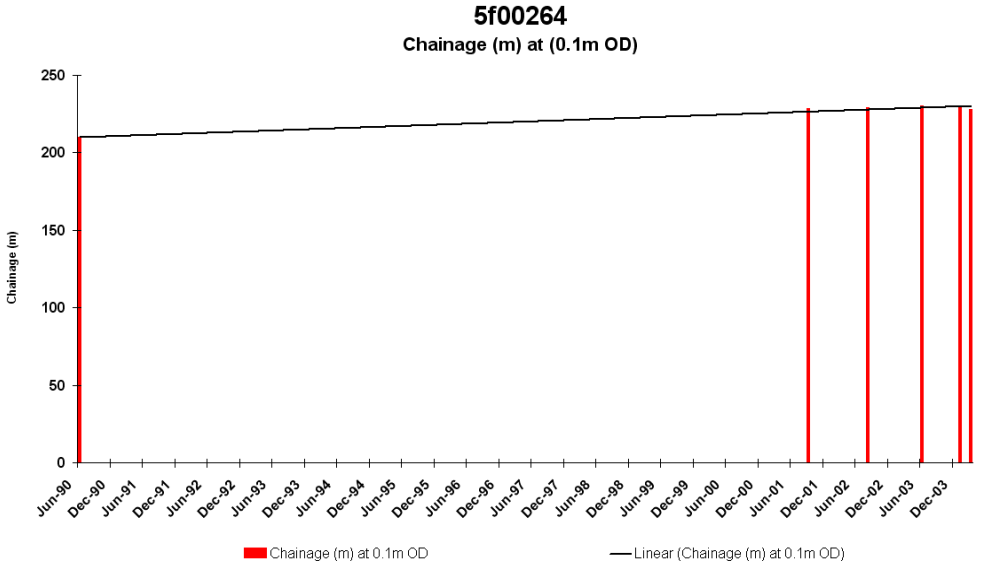


Figure D1.3 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00261



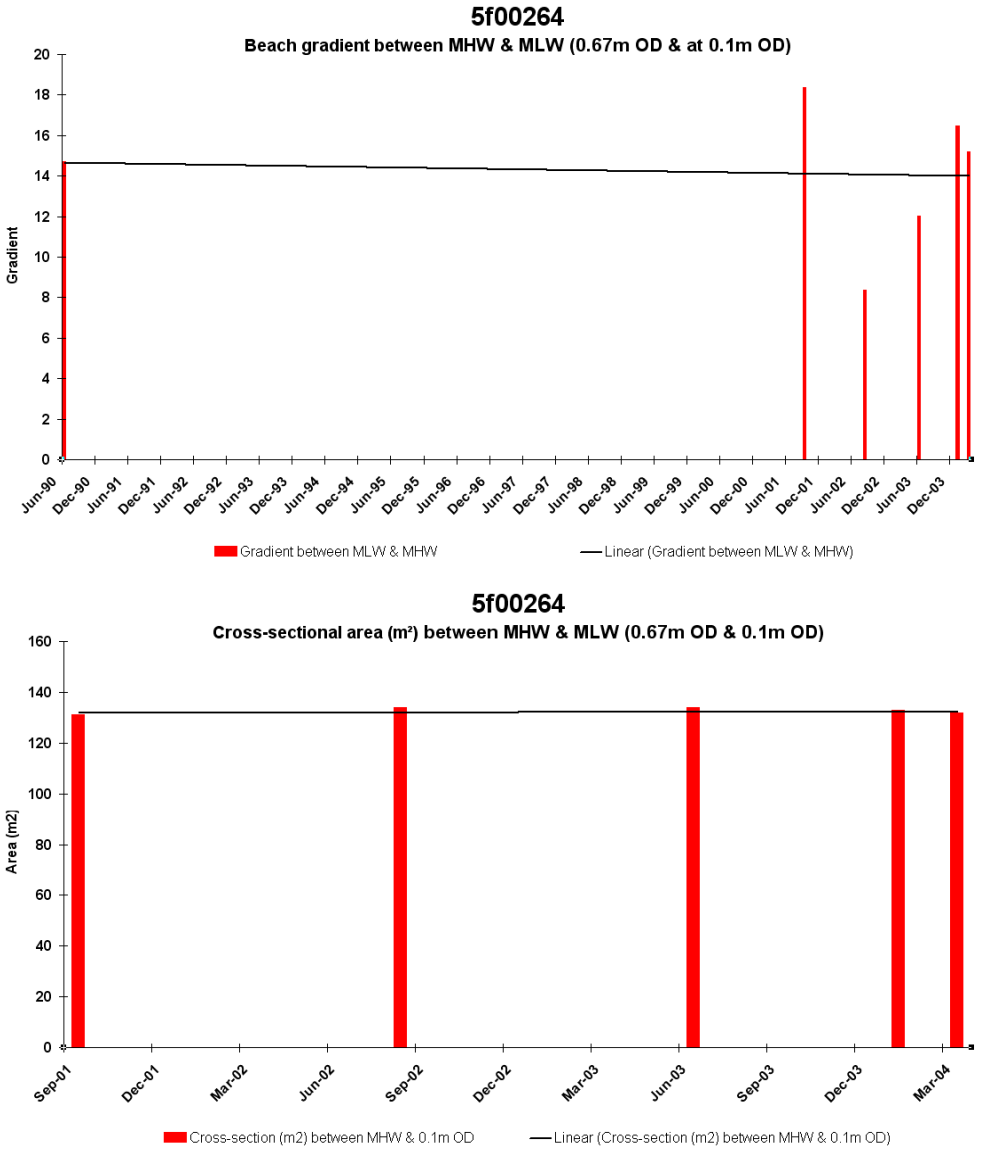
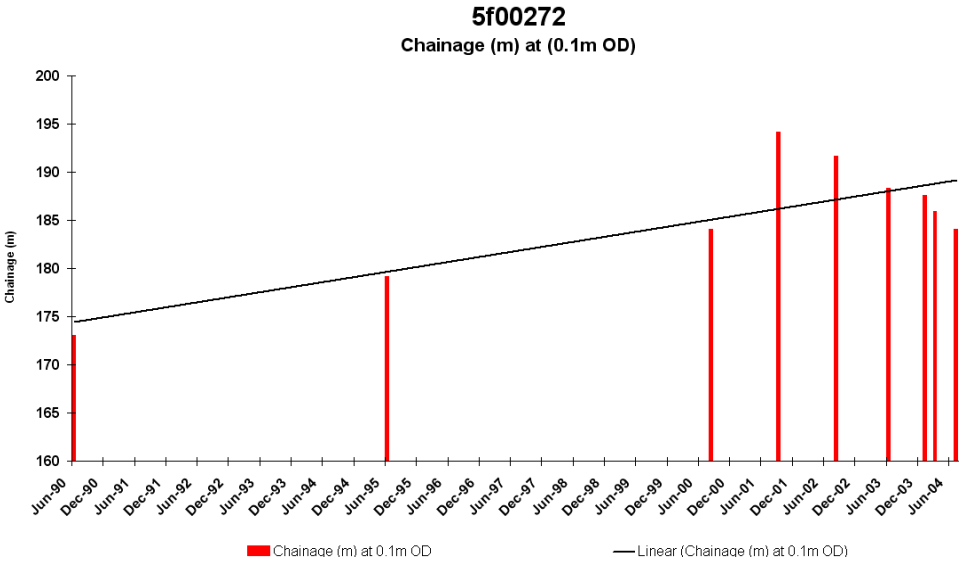
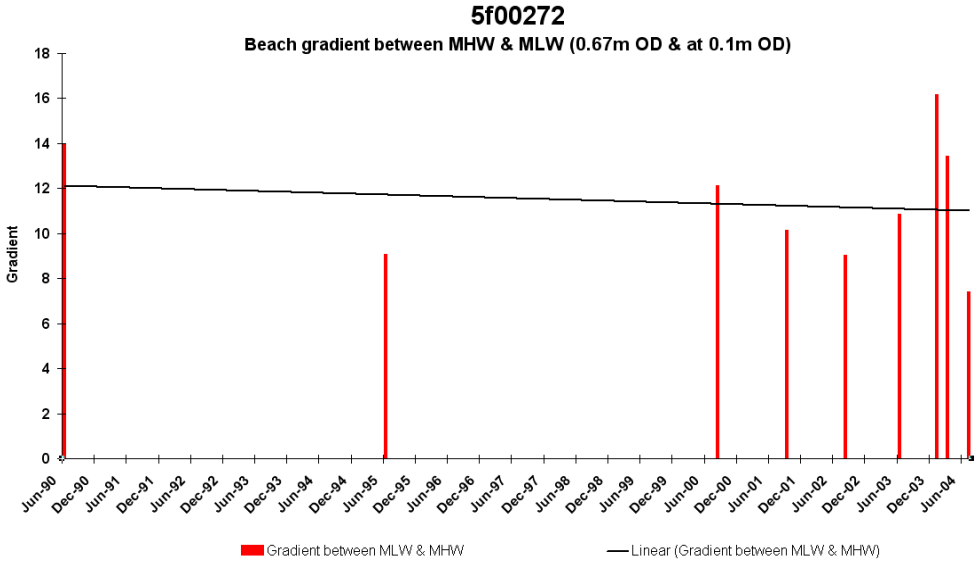


Figure D1.4 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00264


5f00272
Chainage (m) at (0.1m OD)
Chainage (m)
200
195
190
185
180
175
170
165
160
Jun-90
Dec-90
Jun-91
Dec-91
Jun-92
Dec-92
Jun-93
Dec-93
Jun-94
Dec-94
Jun-95
Dec-95
Jun-96
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
Jun-00
Dec-00
Jun-01
Dec-01
Jun-02
Dec-02
Jun-03
Dec-03
Jun-04
Chainage (m) at 0.1m OD
Linear (Chainage (m) at 0.1m OD)


5f00272
Beach gradient between MHW & MLW (0.67m OD & at 0.1m OD)
Gradient
18
16
14
12
10
8
6
4
2
0
Jun-90
Dec-90
Jun-91
Dec-91
Jun-92
Dec-92
Jun-93
Dec-93
Jun-94
Dec-94
Jun-95
Dec-95
Jun-96
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
Jun-00
Dec-00
Jun-01
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Jun-02
Dec-02
Jun-03
Dec-03
Jun-04
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

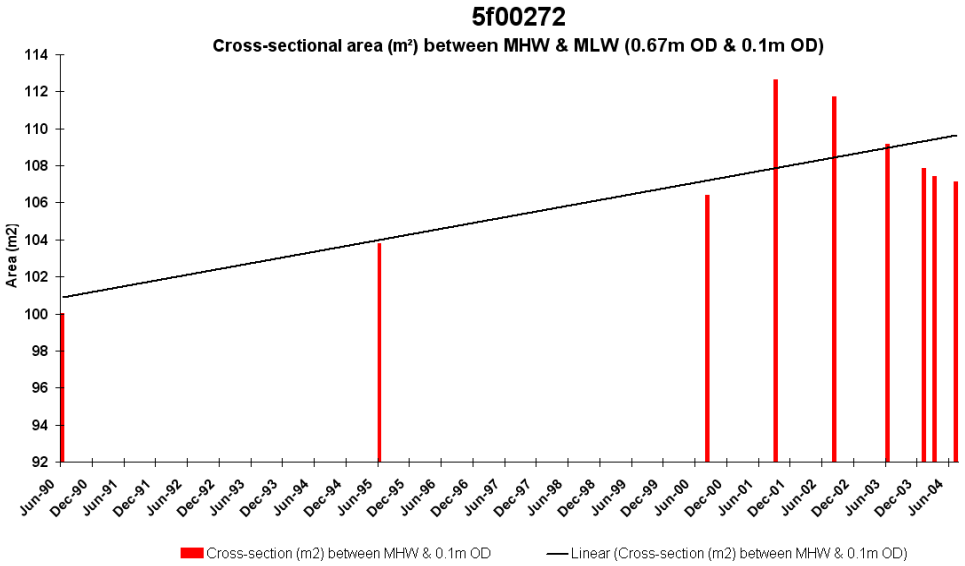
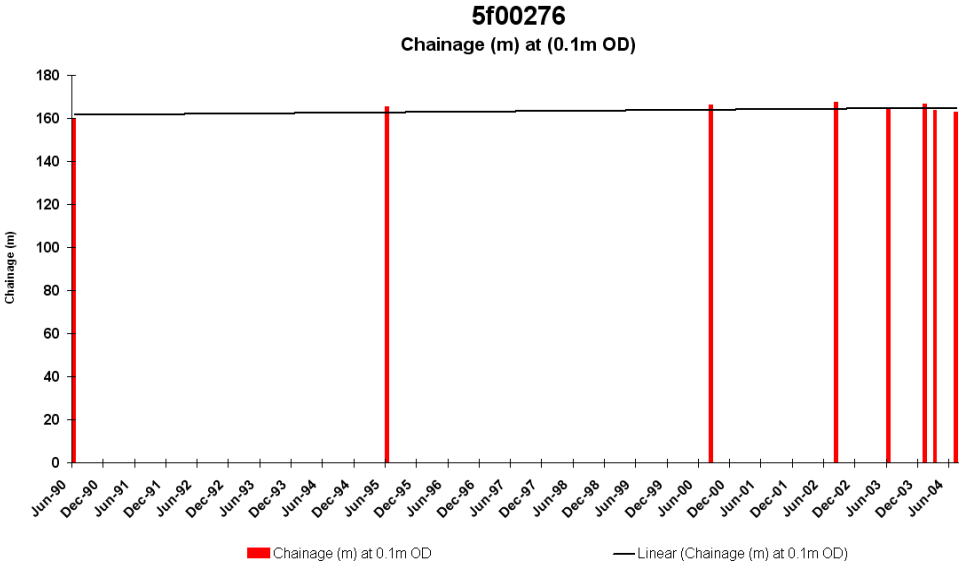


Figure D1.5 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00272



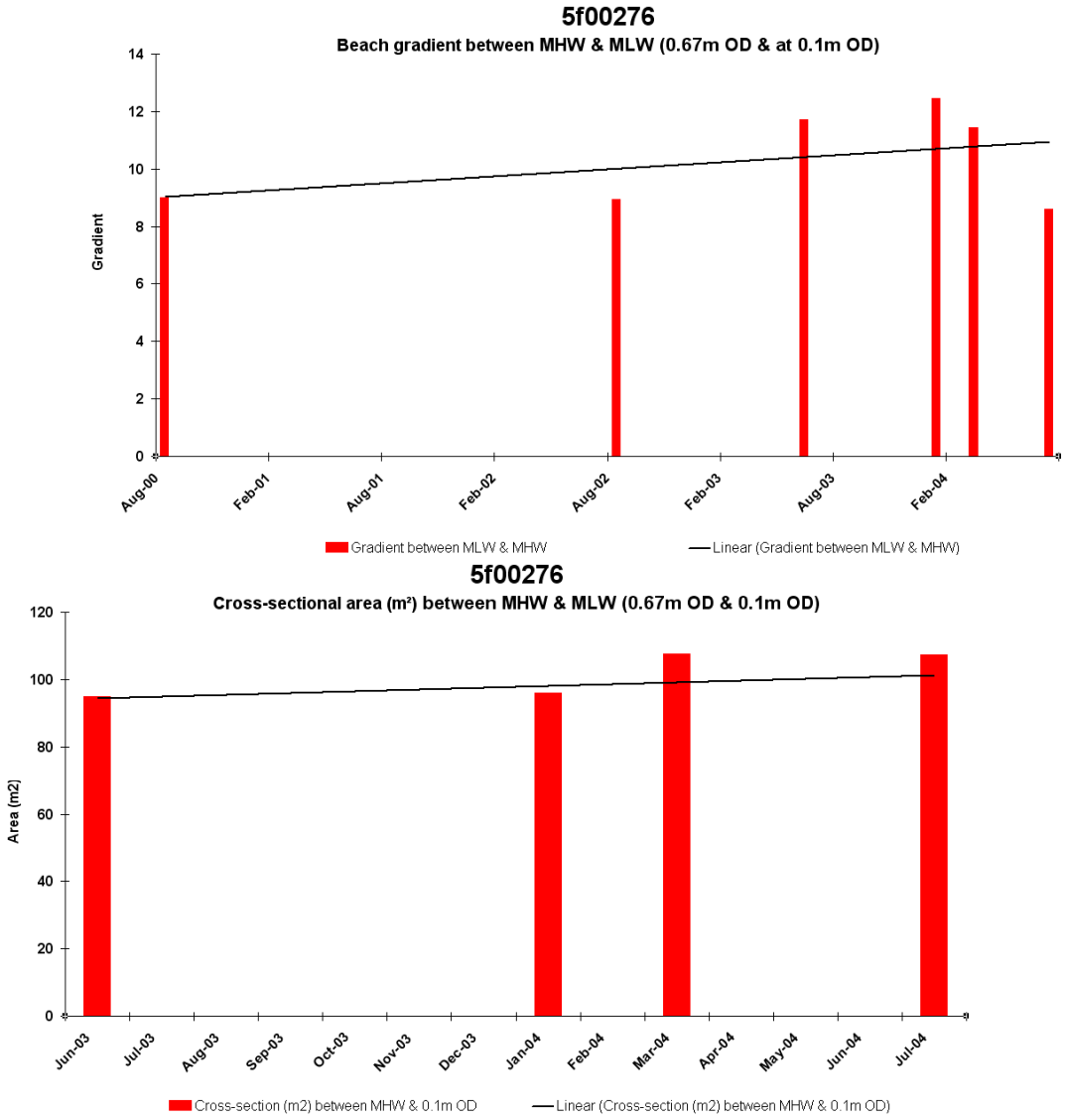
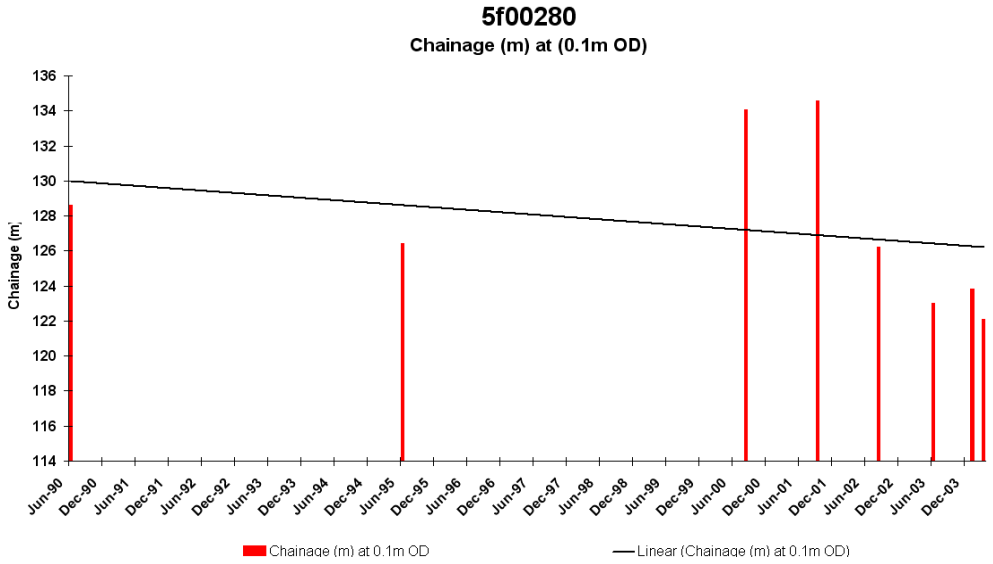
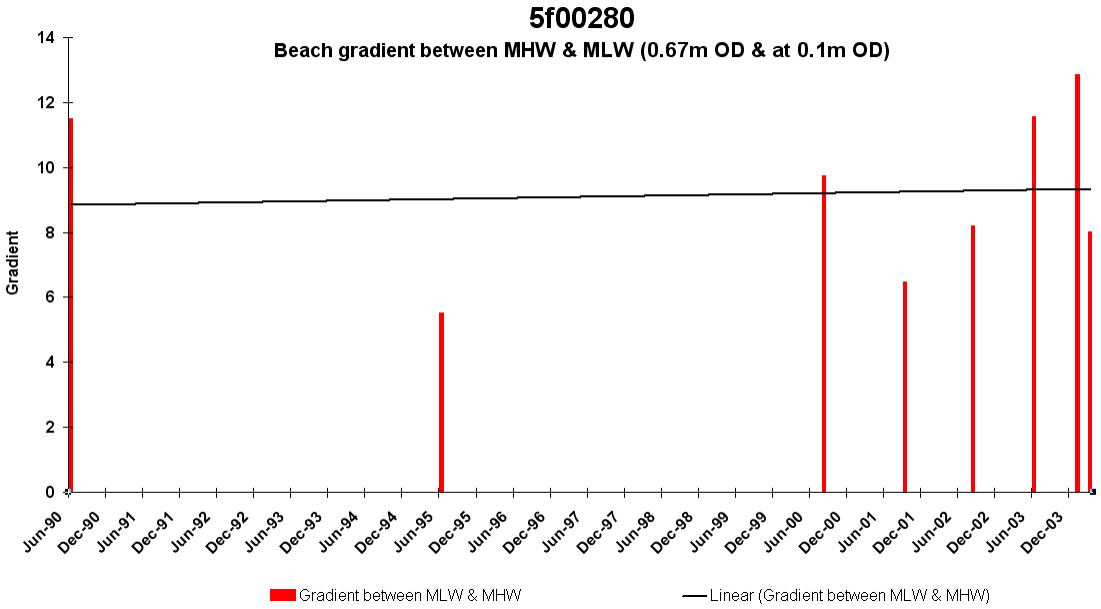


Figure D1.6 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00276


5f00280
Chainage (m) at (0.1m OD)
Chainage (m)
136
134
132
130
128
126
124
122
120
118
116
114
Jun-90
Dec-90
Jun-91
Dec-91
Jun-92
Dec-92
Jun-93
Dec-93
Jun-94
Dec-94
Jun-95
Dec-95
Jun-96
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
Jun-00
Dec-00
Jun-01
Dec-01
Jun-02
Dec-02
Jun-03
Dec-03
Chainage (m) at 0.1m OD
Linear (Chainage (m) at 0.1m OD)


5f00280
Beach gradient between MHW & MLW (0.67m OD & at 0.1m OD)
Gradient
14
12
10
8
6
4
2
0
Jun-90
Dec-90
Jun-91
Dec-91
Jun-92
Dec-92
Jun-93
Dec-93
Jun-94
Dec-94
Jun-95
Dec-95
Jun-96
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
Jun-00
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Dec-01
Jun-02
Dec-02
Jun-03
Dec-03
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

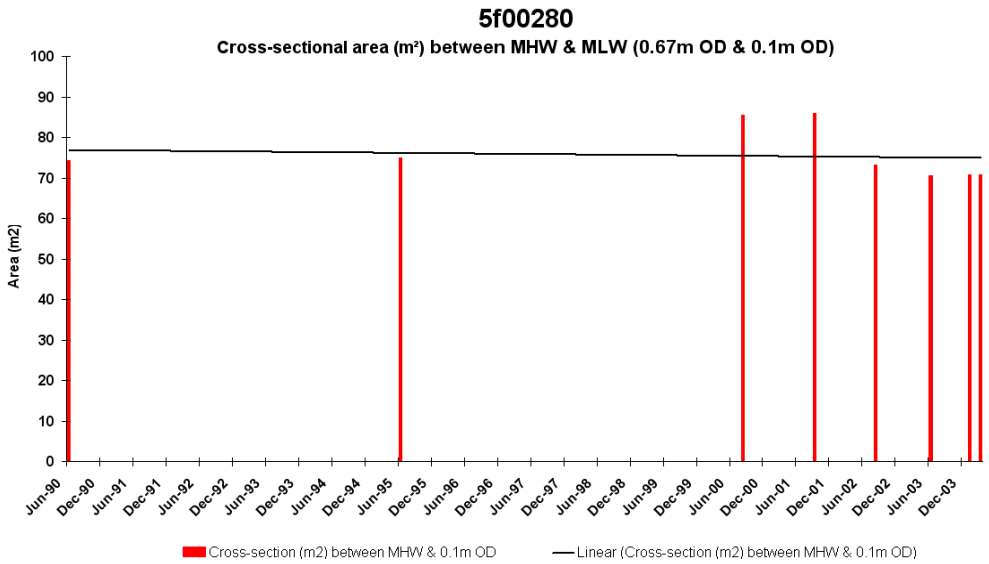
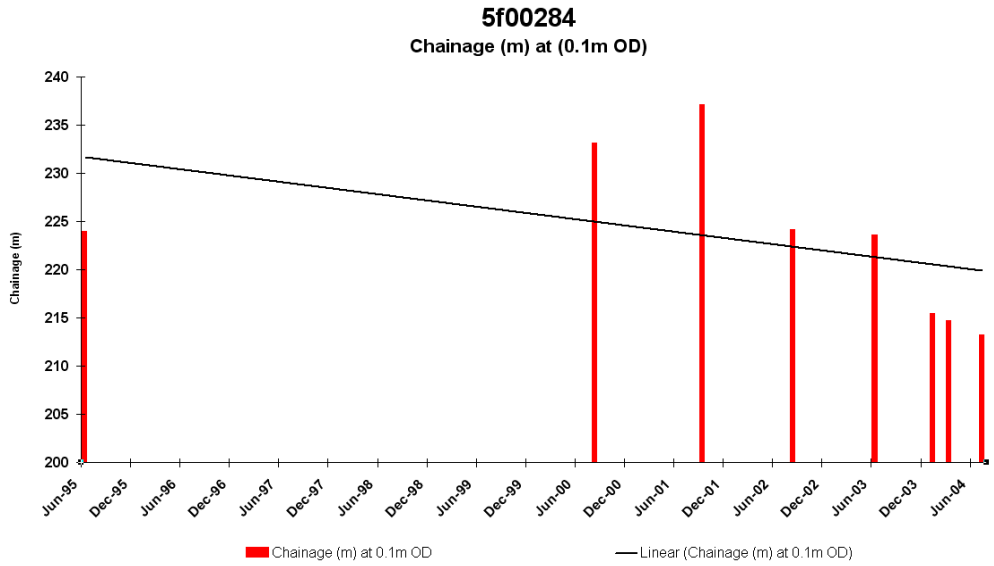


Figure D1.7 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00280



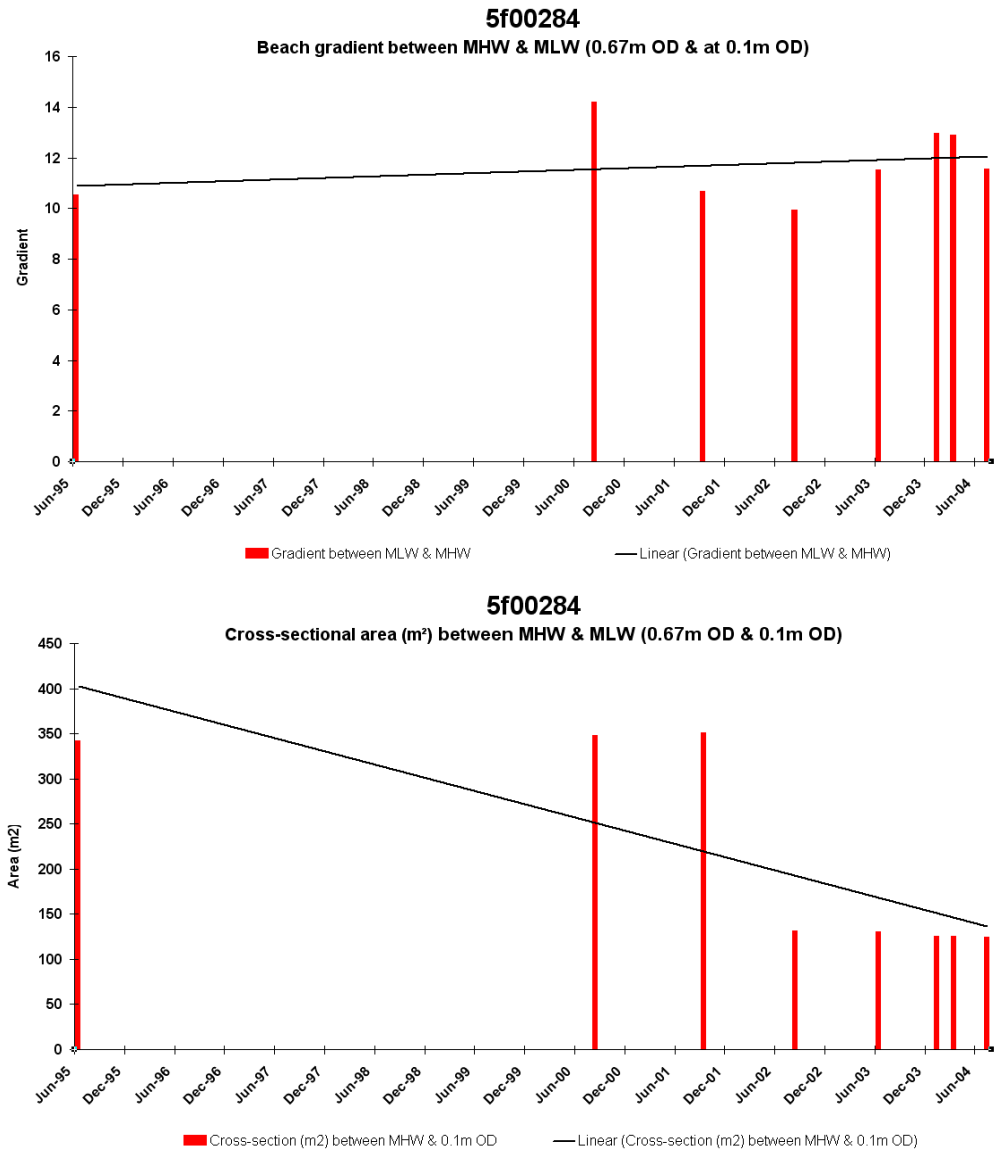
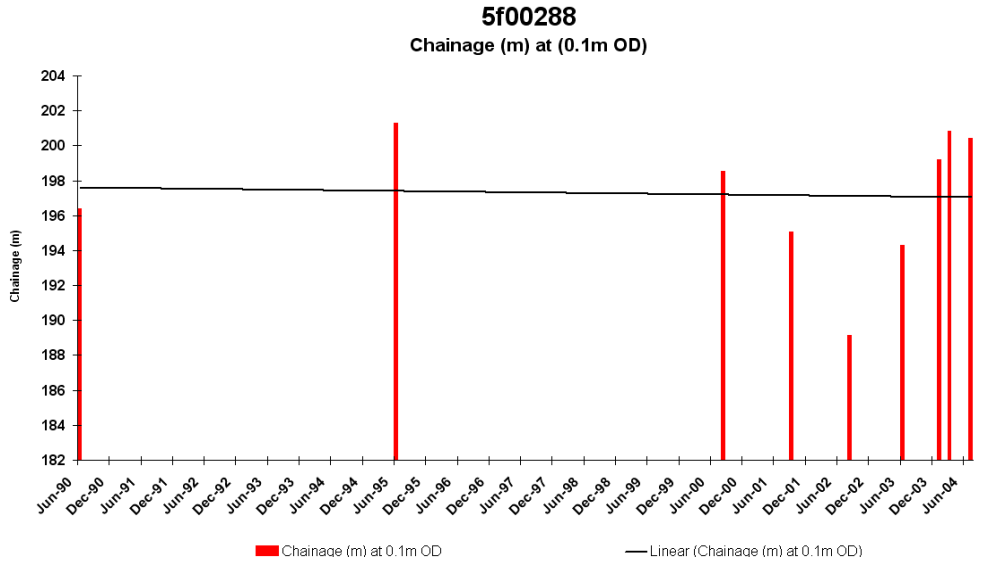
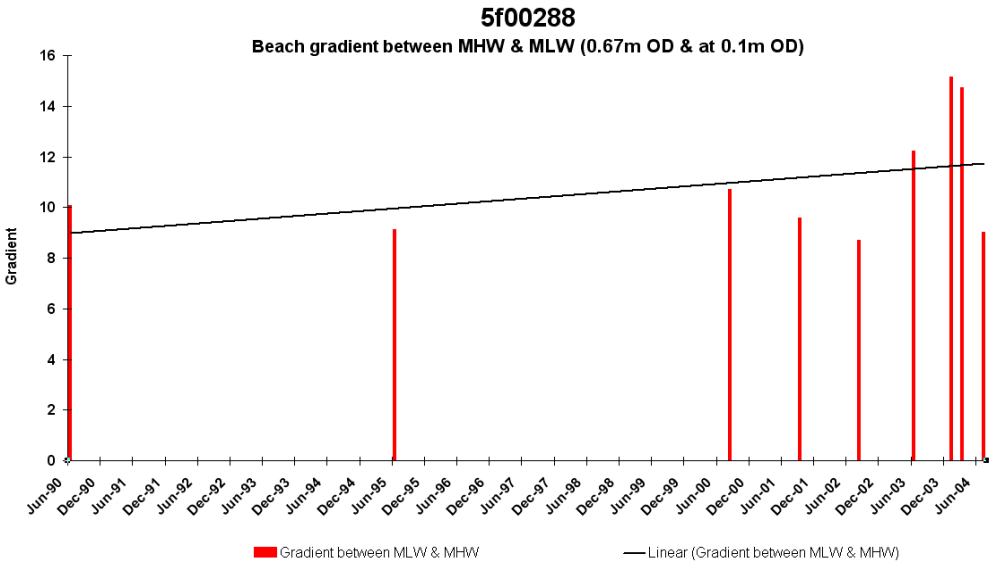


Figure D1.8 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00284


5f00288
Chainage (m) at (0.1m OD)
Chainage (m)
Chainage (m) at 0.1m OD
Linear (Chainage (m) at 0.1m OD)


5f00288
Beach gradient between MHW & MLW (0.67m OD & at 0.1m OD)
Gradient
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

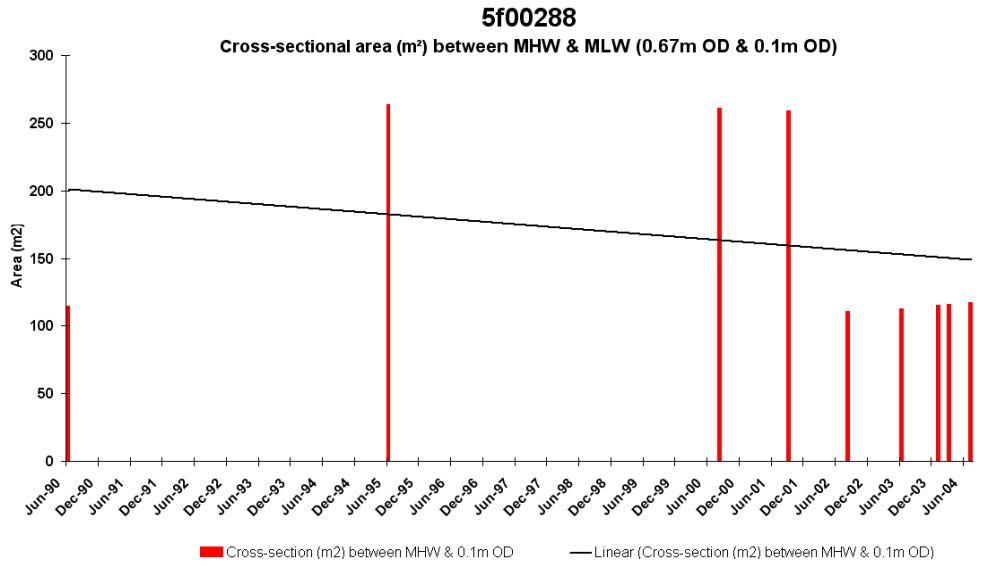
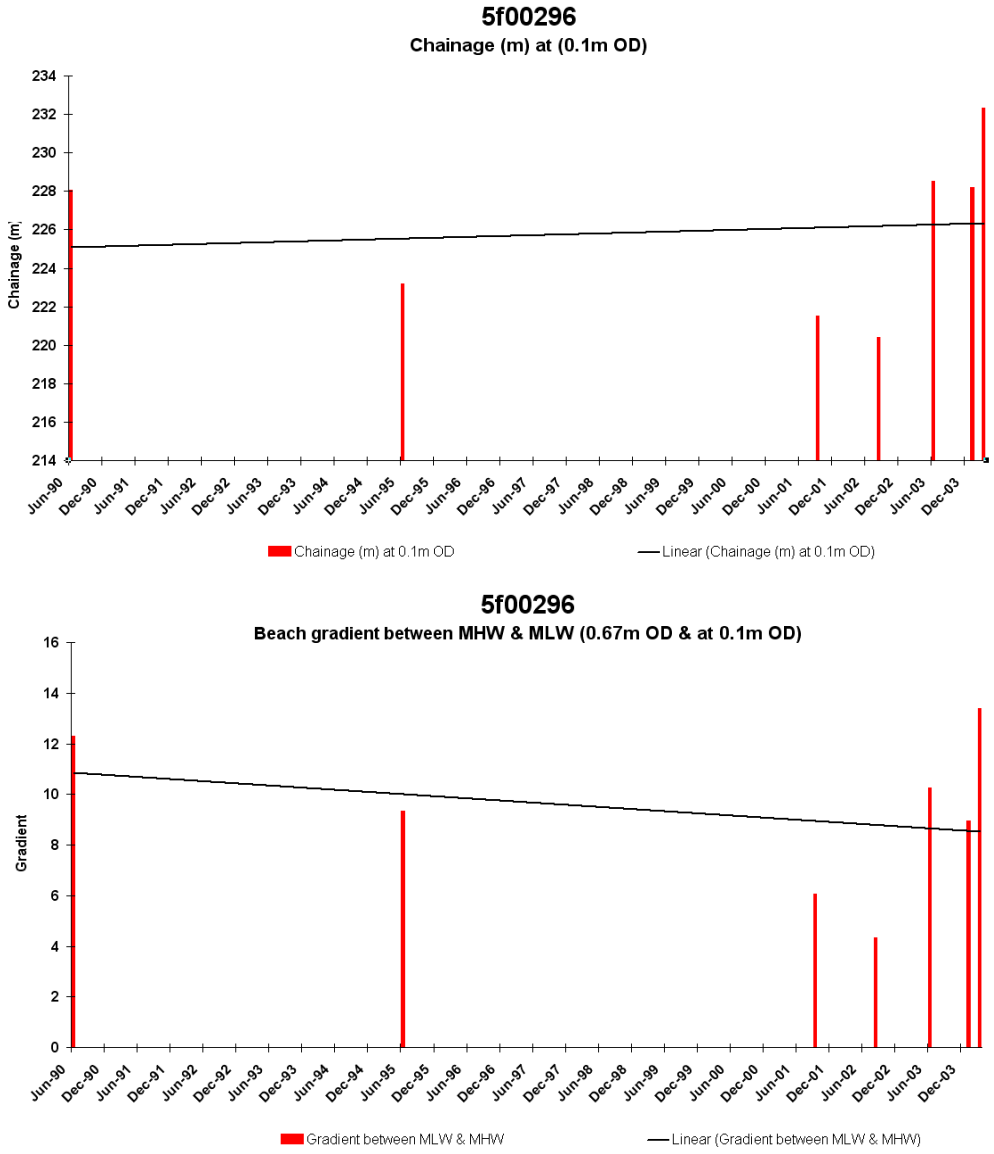

5f00288
Cross-sectional area (m²) between MHW & MLW (0.67m OD & 0.1m OD)
Area (m2)
Cross-section (m2) between MHW & 0.1m OD
Linear (Cross-section (m2) between MHW & 0.1m OD)

Figure D1.9 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00288



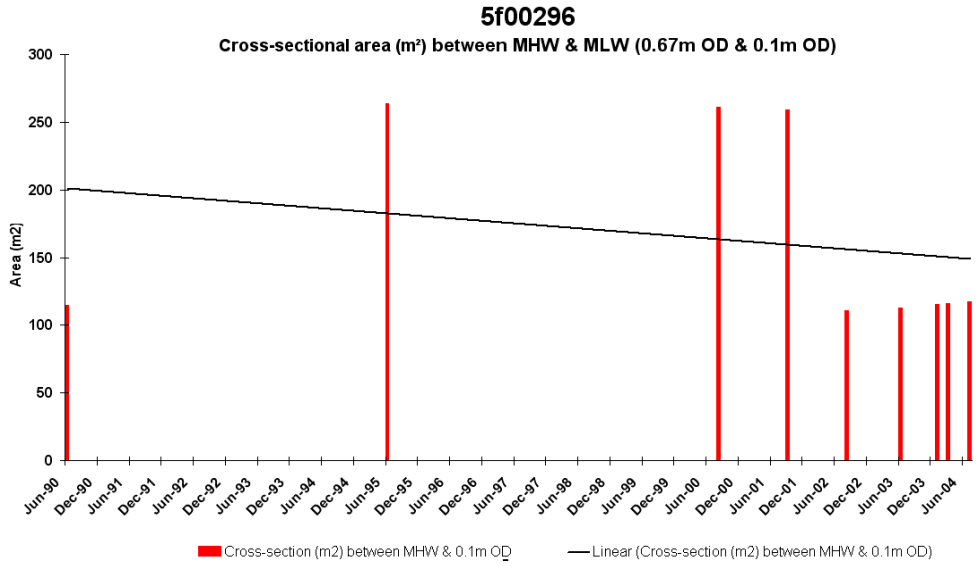
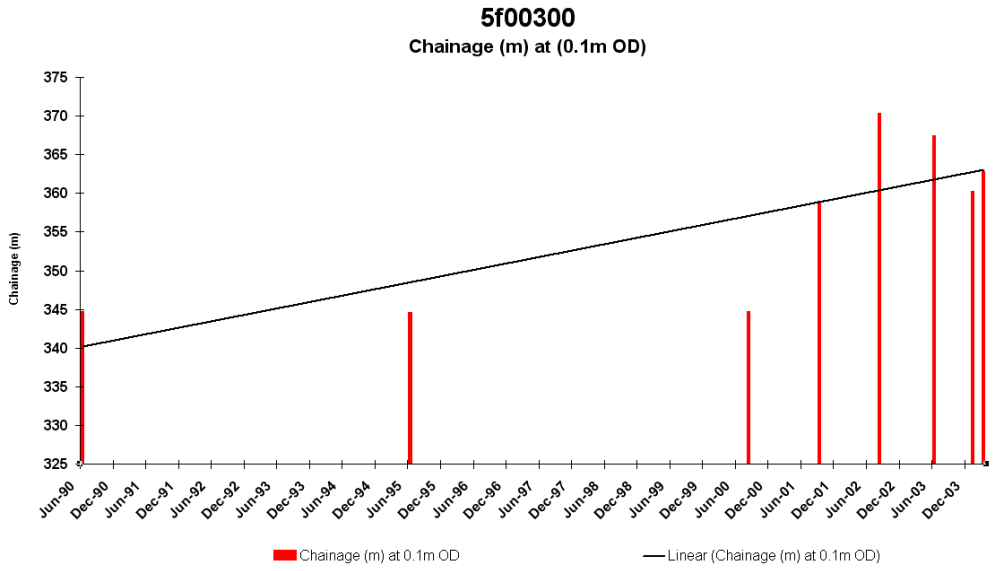


Figure D1.10 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00296



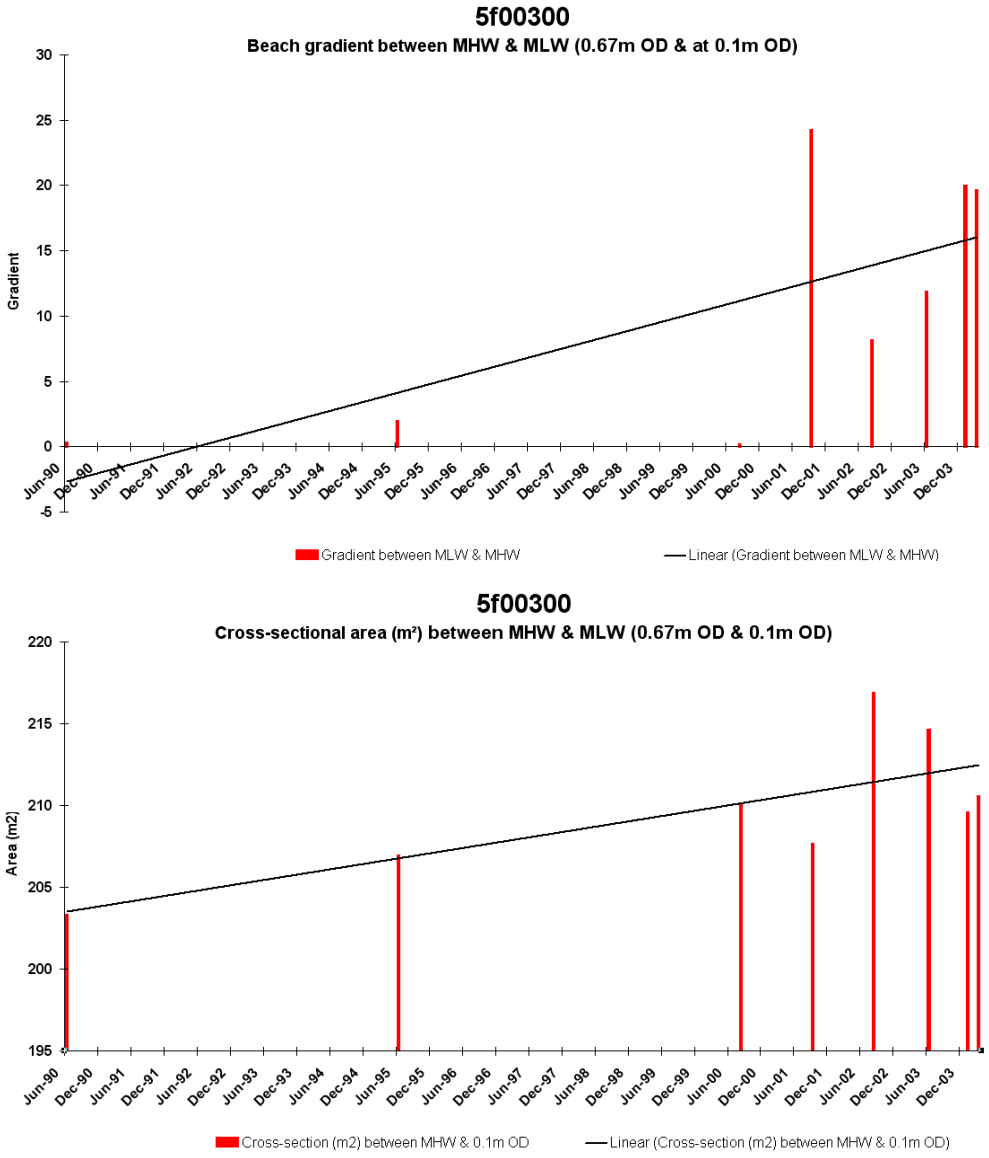
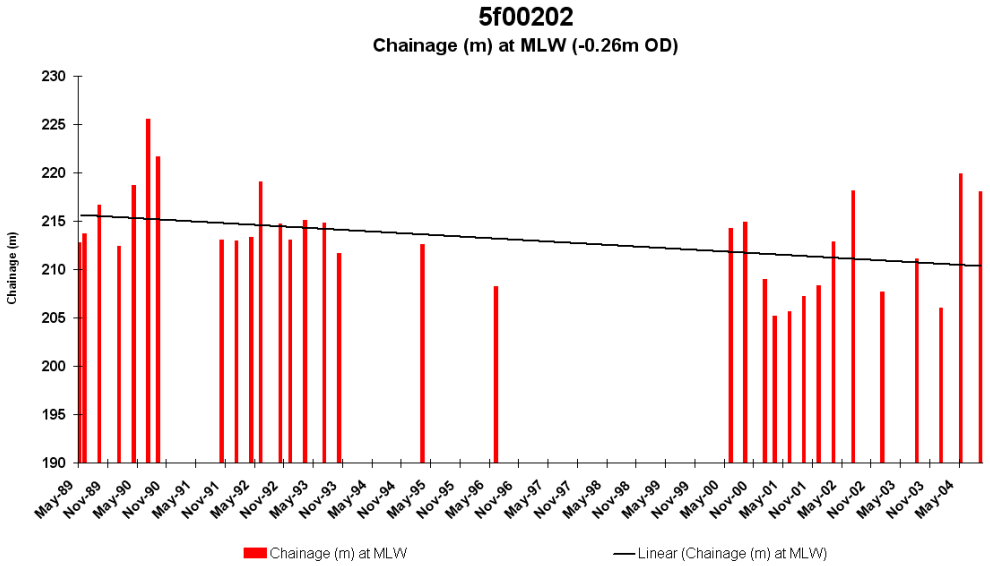
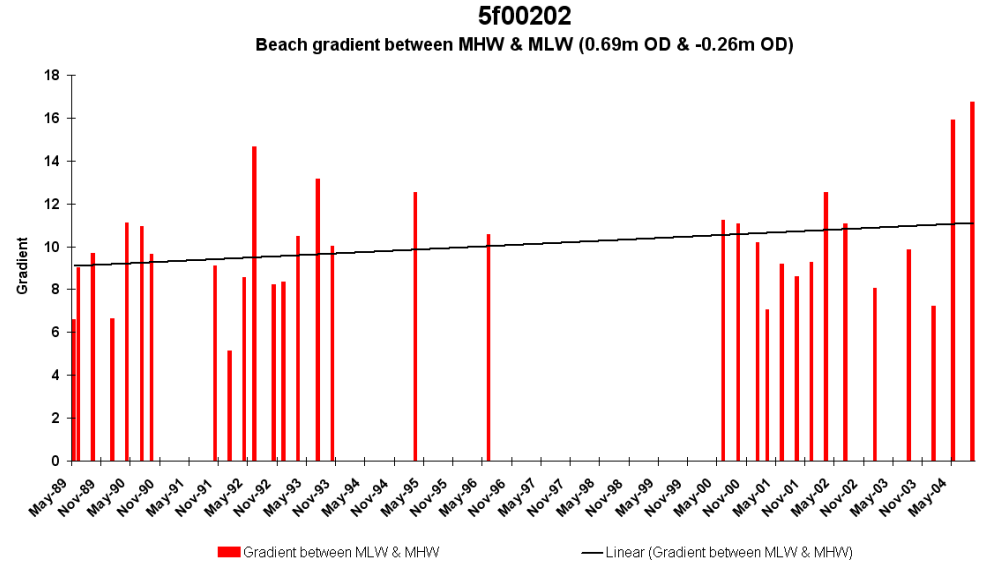


Figure D1.11 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00300

CBY3


5f00202
Chainage (m) at MLW (-0.26m OD)
Chainage (m)
230
225
220
215
210
205
200
195
190
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00202
Beach gradient between MHW & MLW (0.69m OD & -0.26m OD)
Gradient
18
16
14
12
10
8
6
4
2
0
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
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May-02
Nov-02
May-03
Nov-03
May-04
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

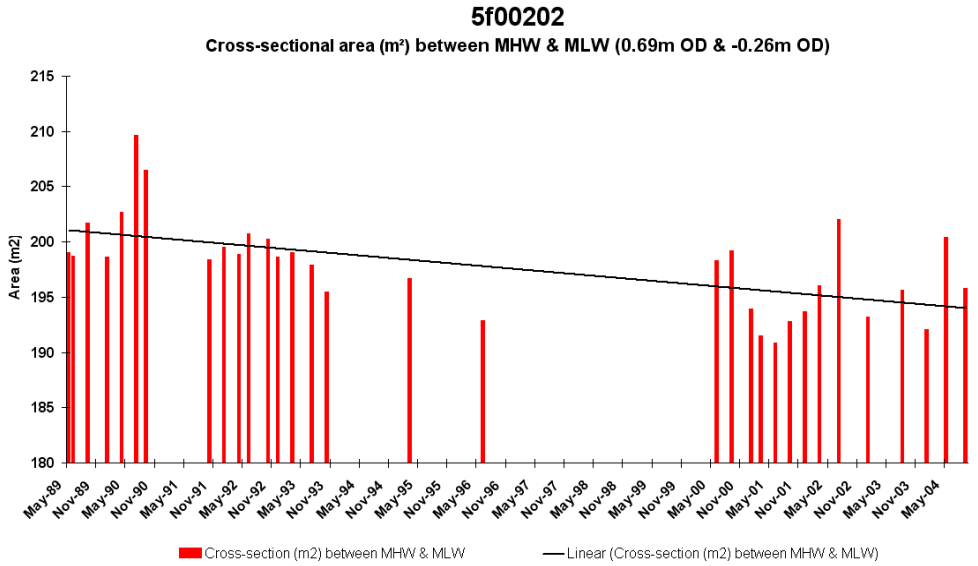
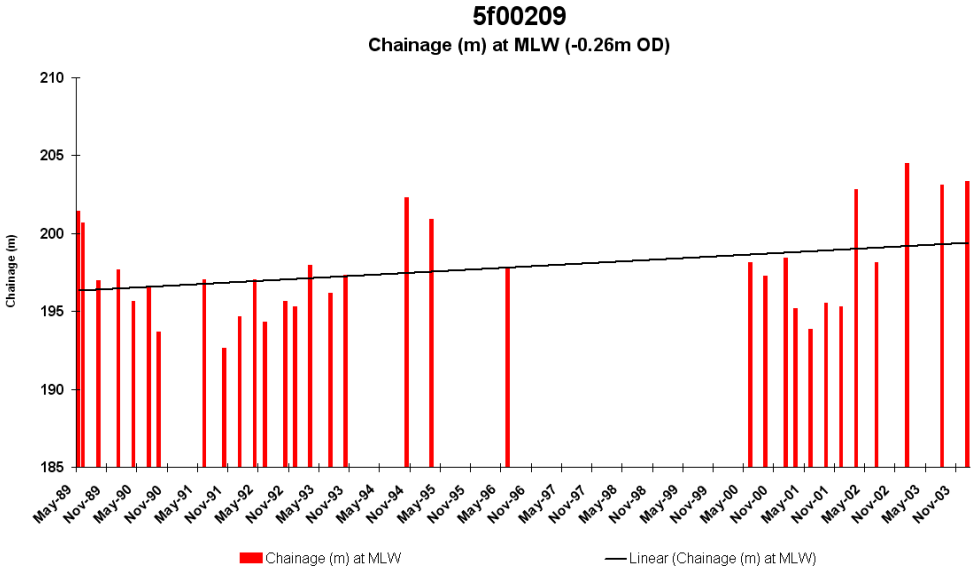


Figure D2.1 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00202



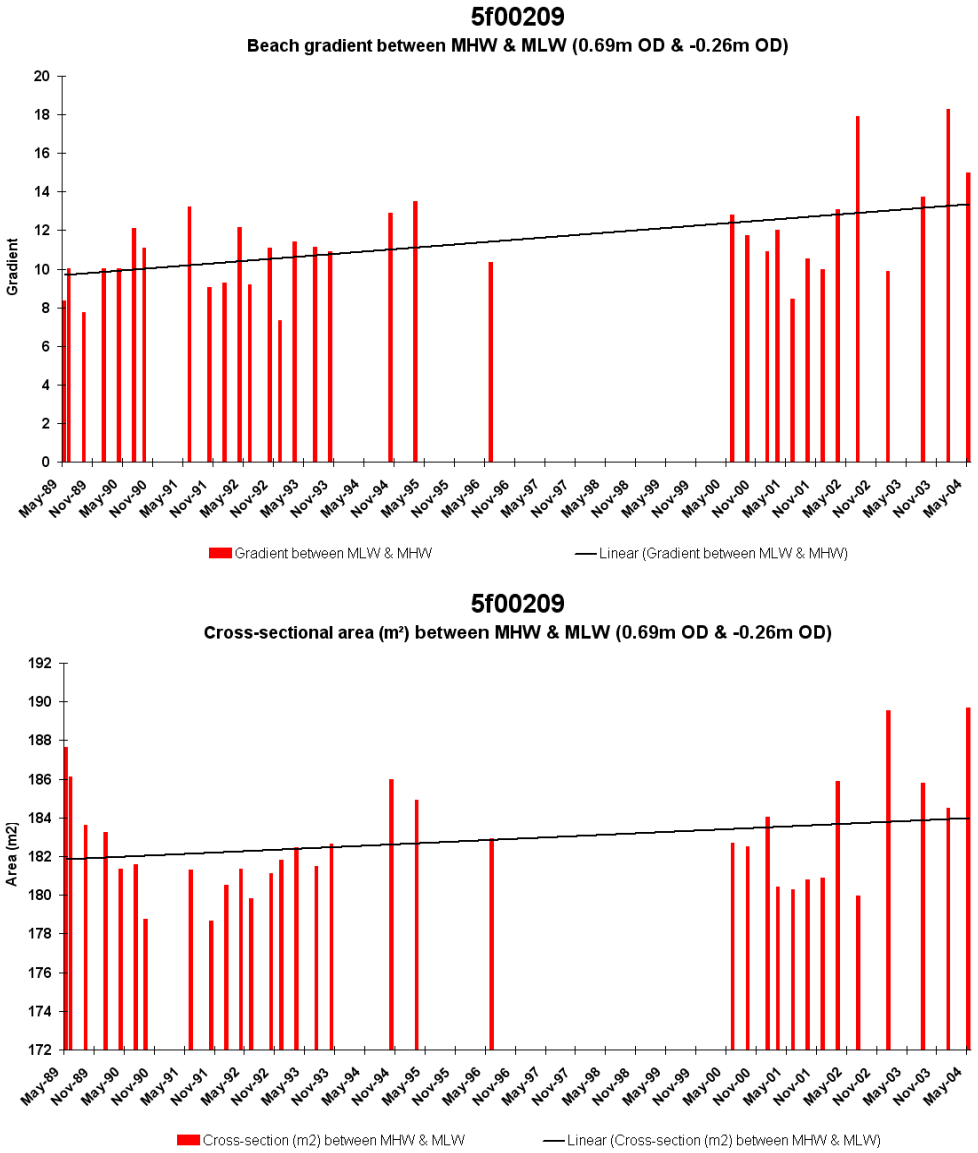
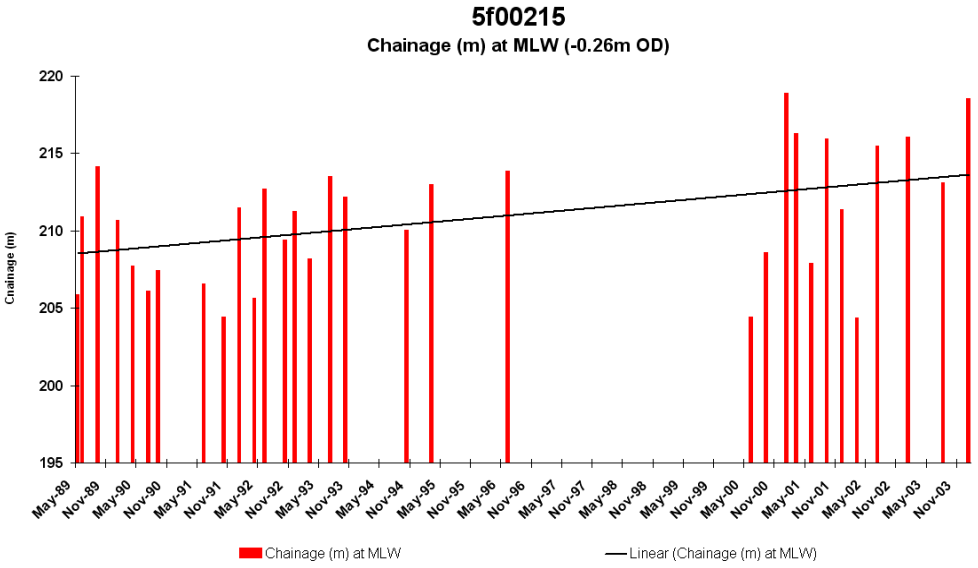
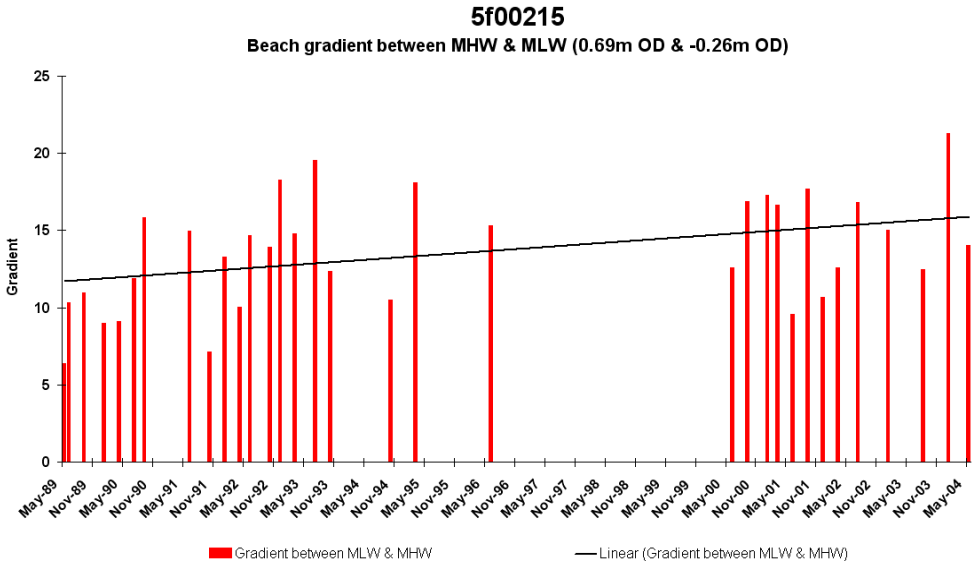


Figure D2.2 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00209


5f00215
Chainage (m) at MLW (-0.26m OD)
Chainage (m)
220
215
210
205
200
195
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00215
Beach gradient between MHW & MLW (0.69m OD & -0.26m OD)
Gradient
25
20
15
10
5
0
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

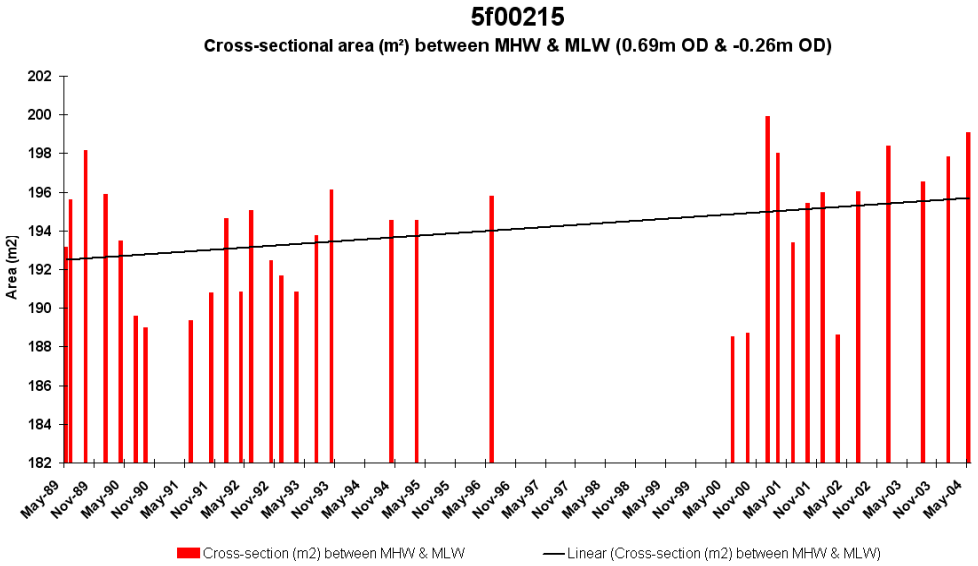
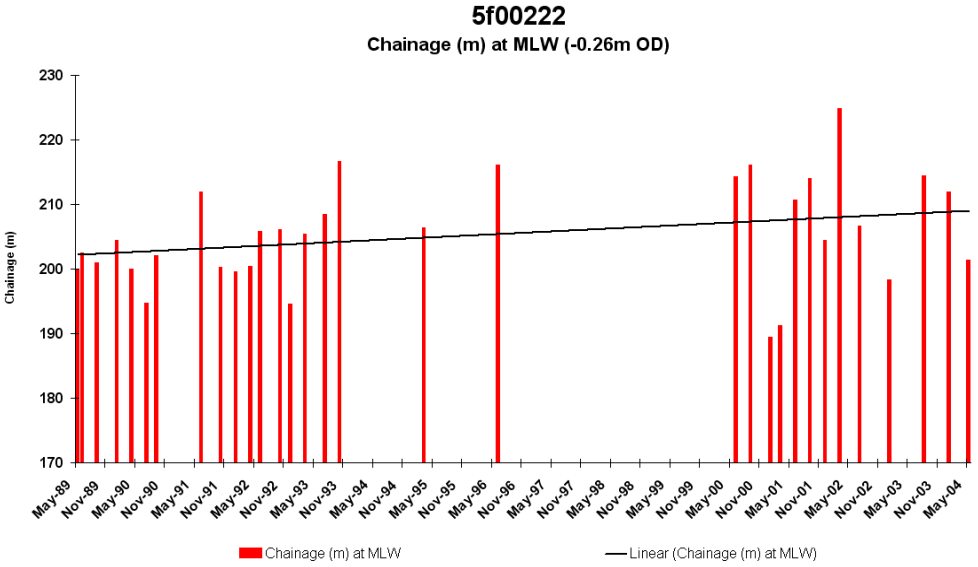


Figure D2.3 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00215



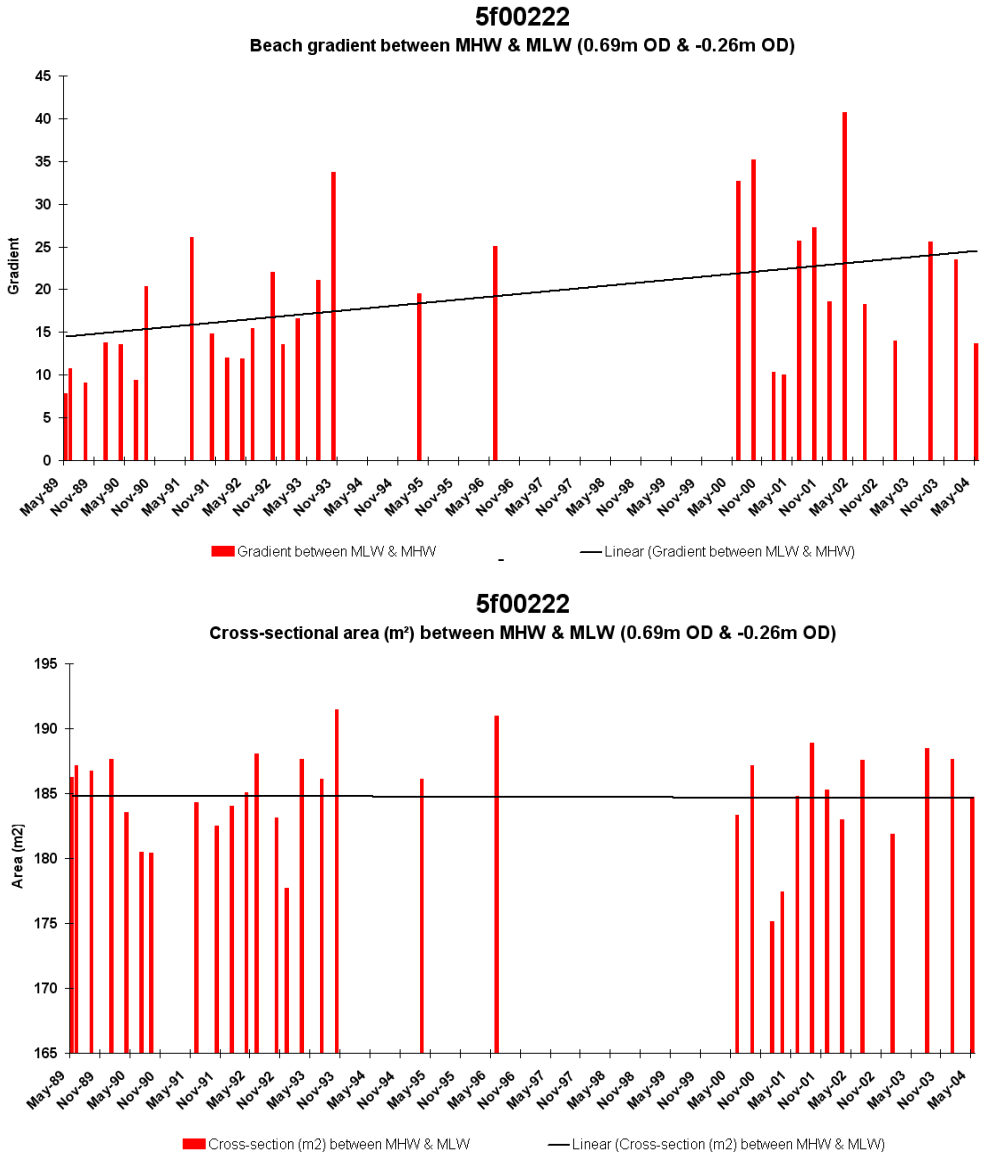
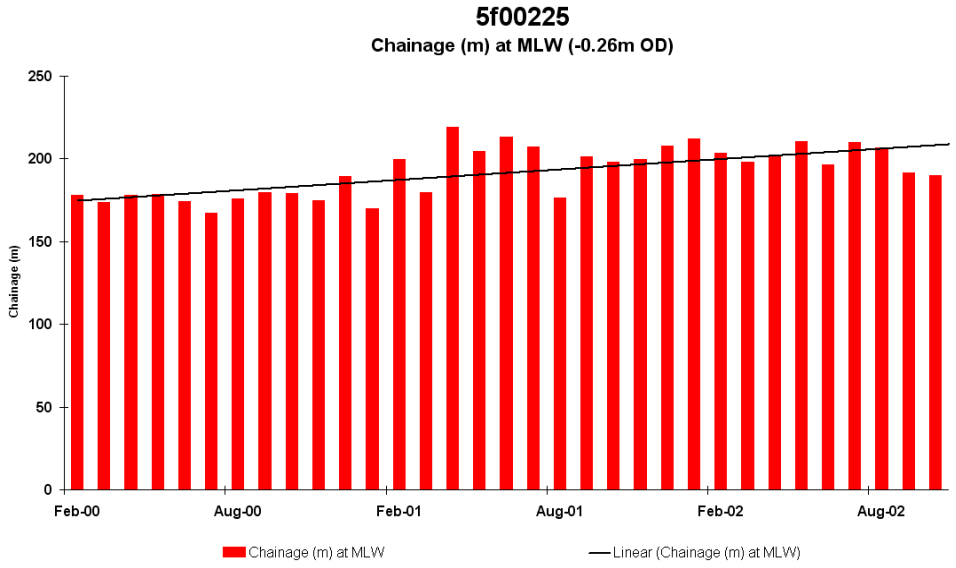
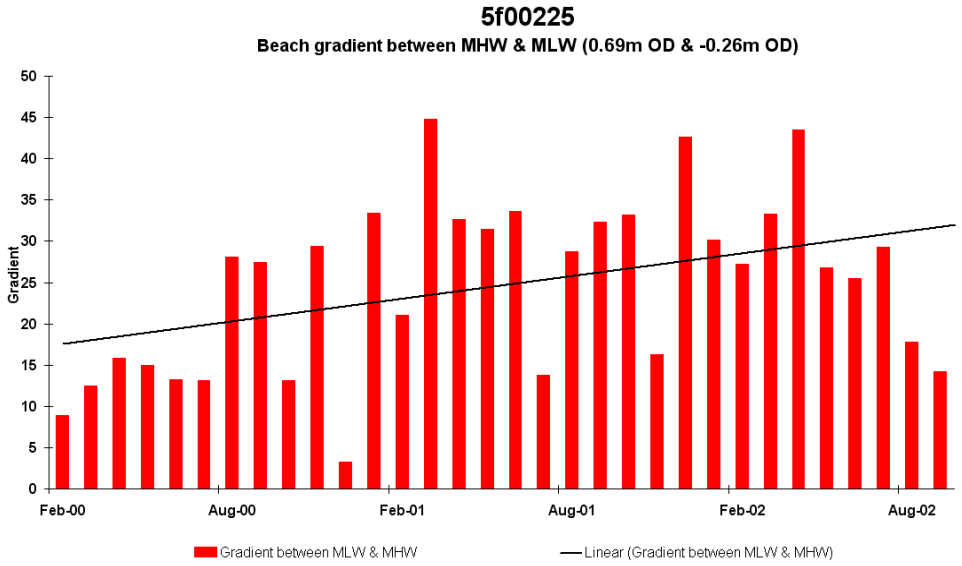


Figure D2.4 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00222


5f00225
Chainage (m) at MLW (-0.26m OD)
250
200
150
100
50
0
Chainage (m)
Feb-00
Aug-00
Feb-01
Aug-01
Feb-02
Aug-02
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00225
Beach gradient between MHW & MLW (0.69m OD & -0.26m OD)
50
45
40
35
30
25
20
15
10
5
0
Gradient
Feb-00
Aug-00
Feb-01
Aug-01
Feb-02
Aug-02
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

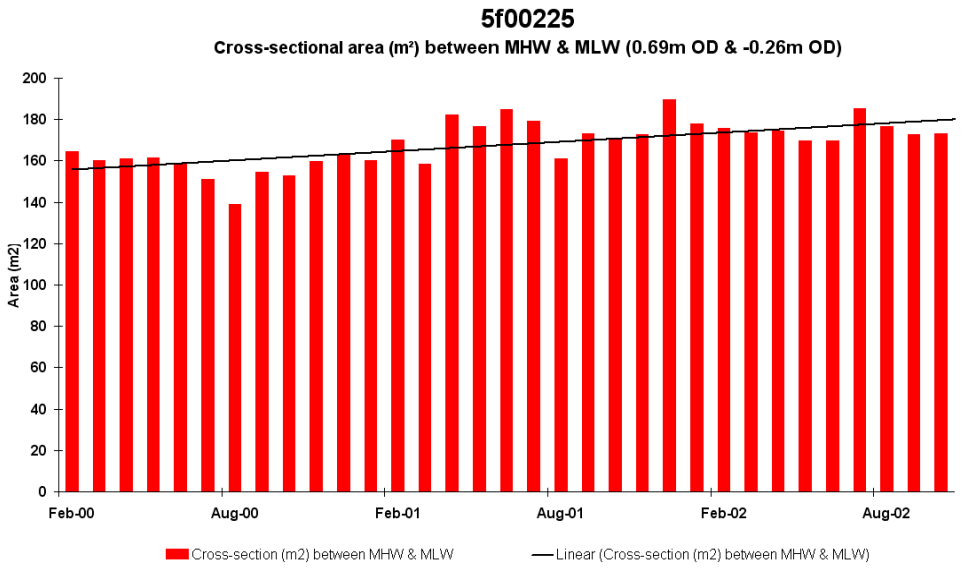
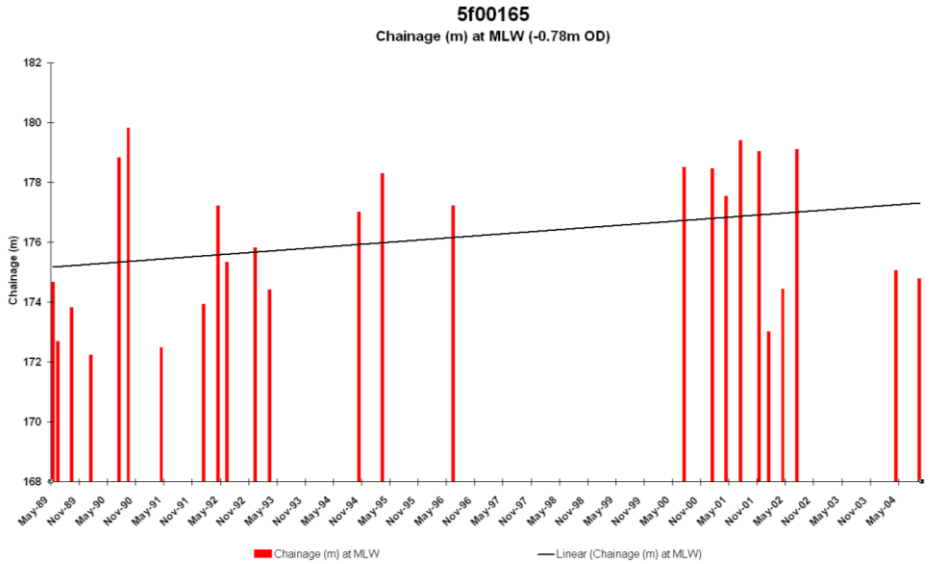
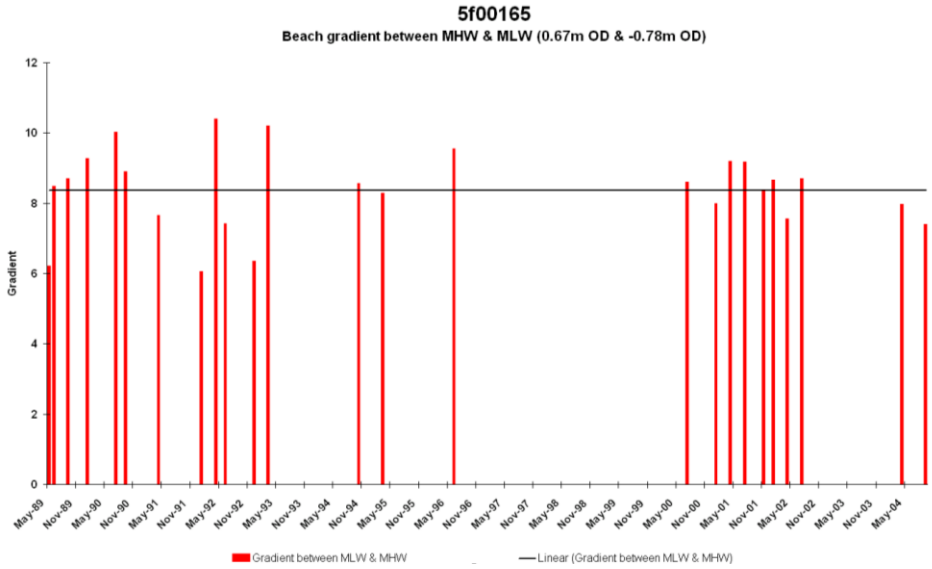


Figure D2.5 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00225

CBY4


5f00165
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
182
180
178
176
174
172
170
168
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00165
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
12
10
8
6
4
2
0
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

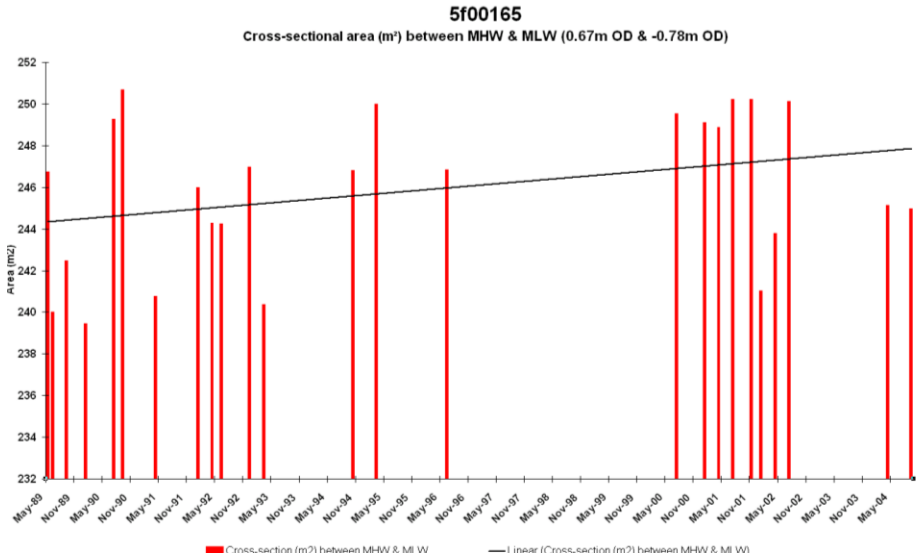
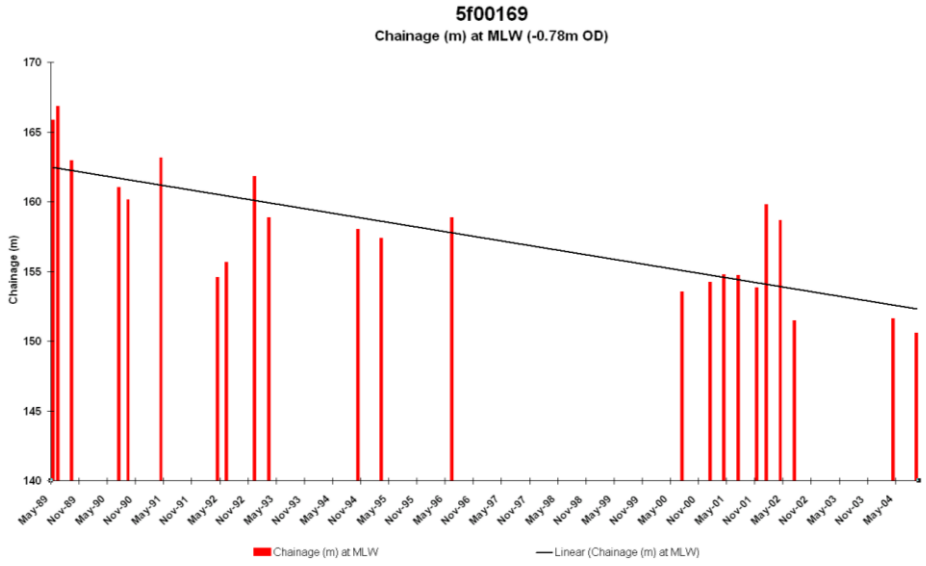


Figure D3.1 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00165



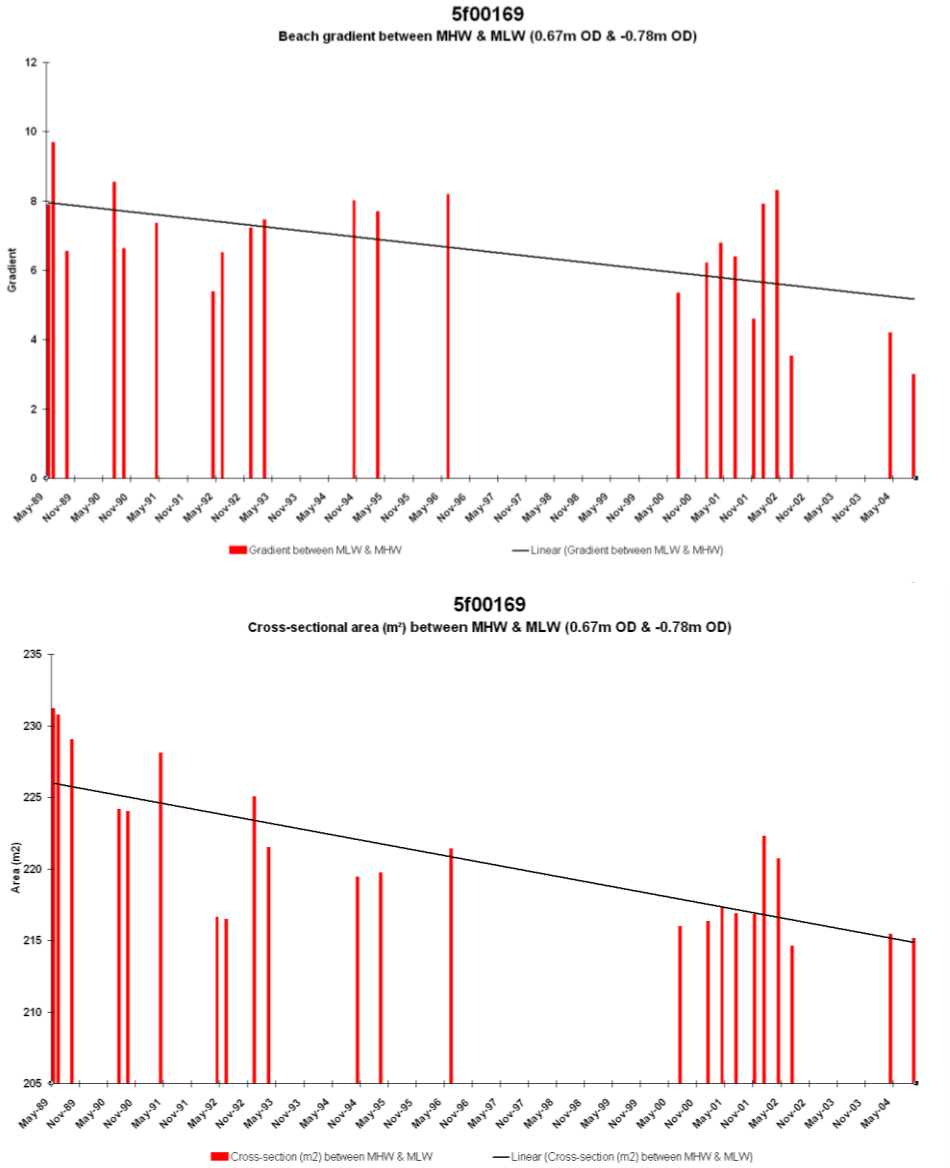
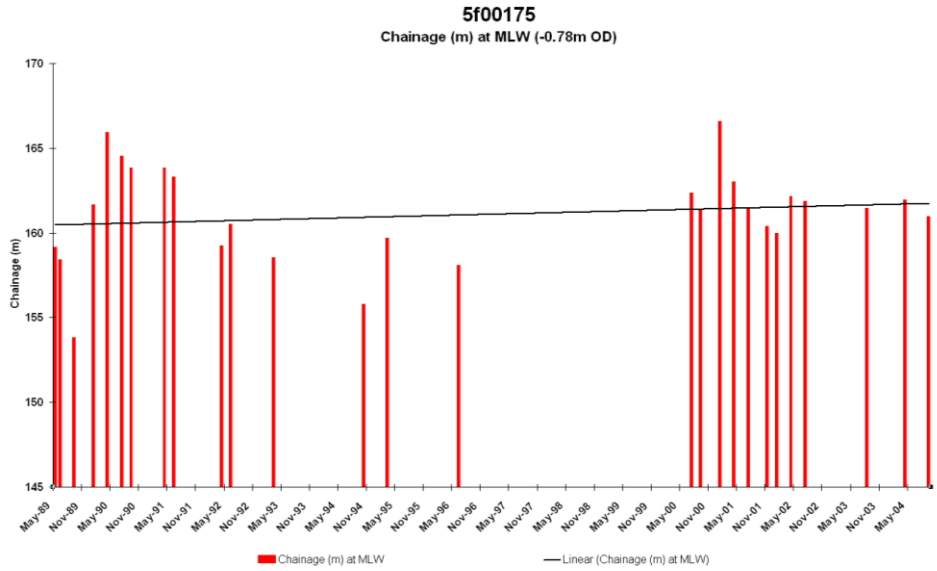
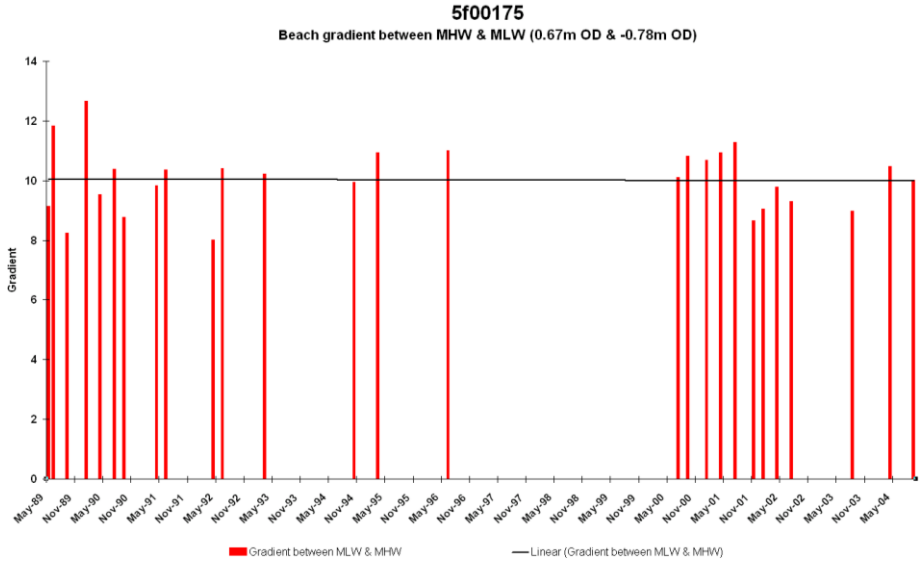


Figure D3.2 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00169


5f00175
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
170
165
160
155
150
145
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00175
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
14
12
10
8
6
4
2
0
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

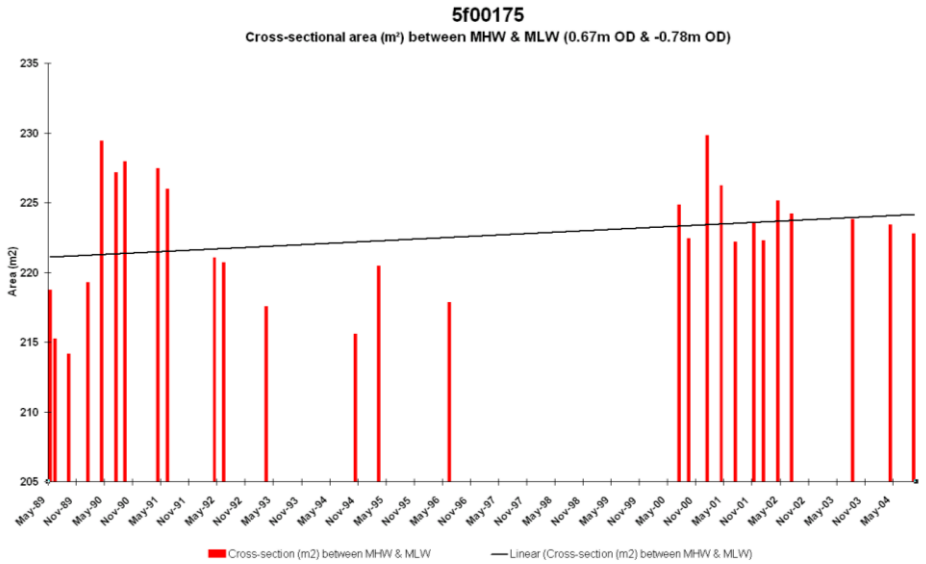
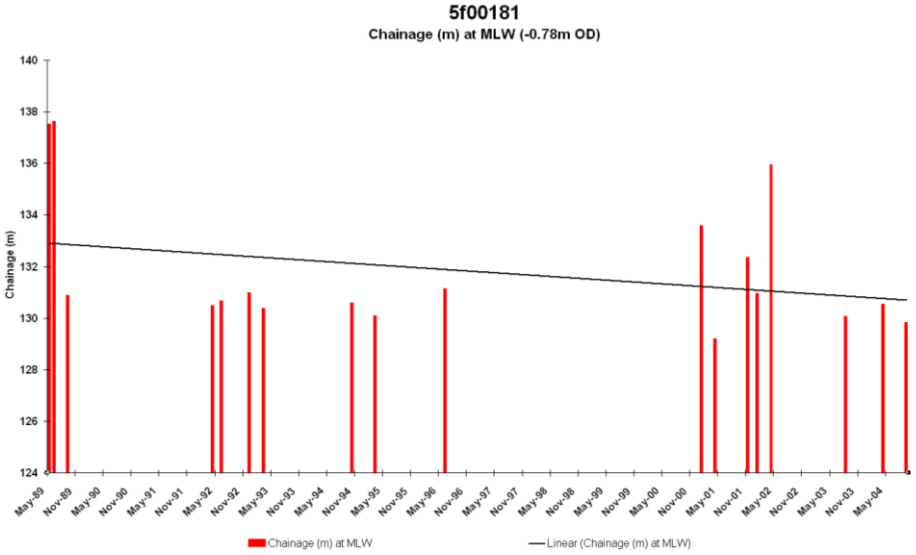


Figure D3.3 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00175



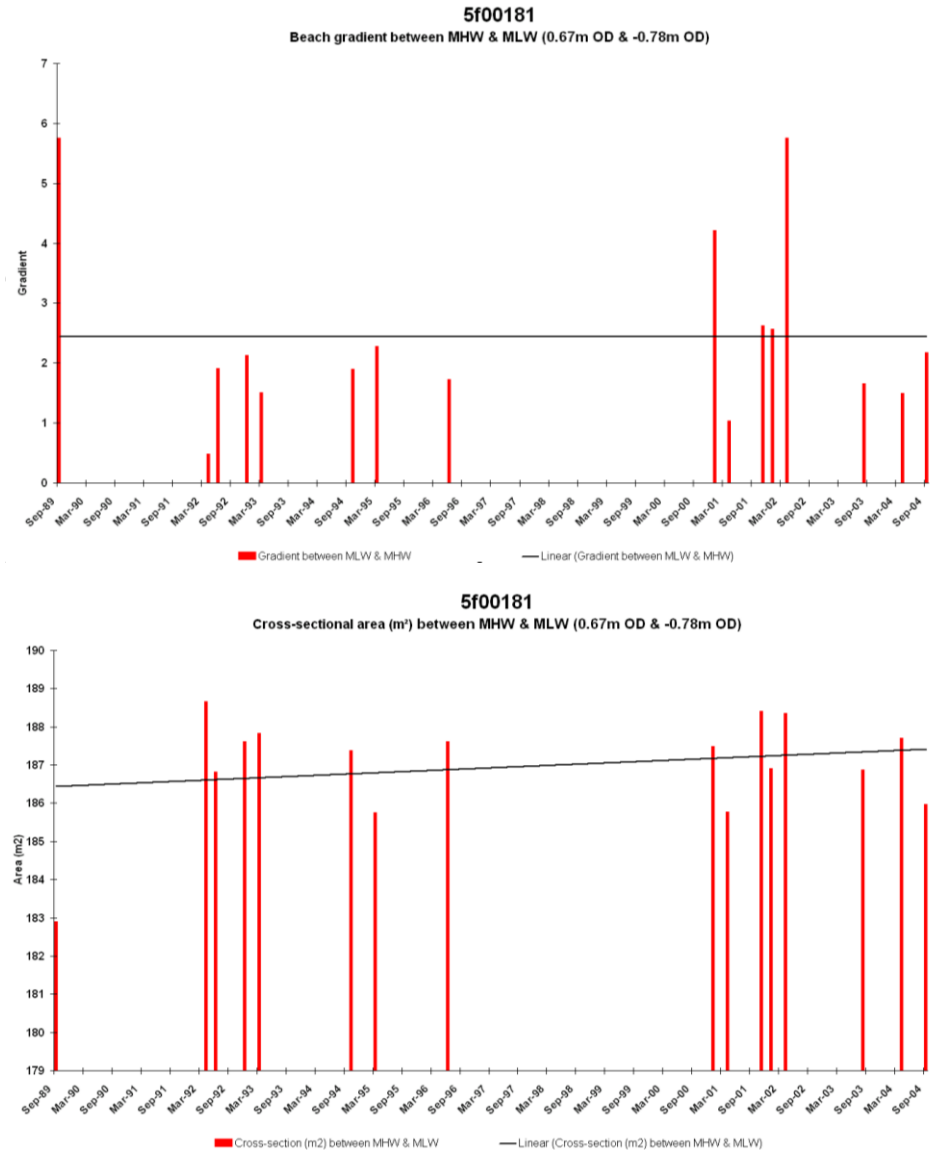
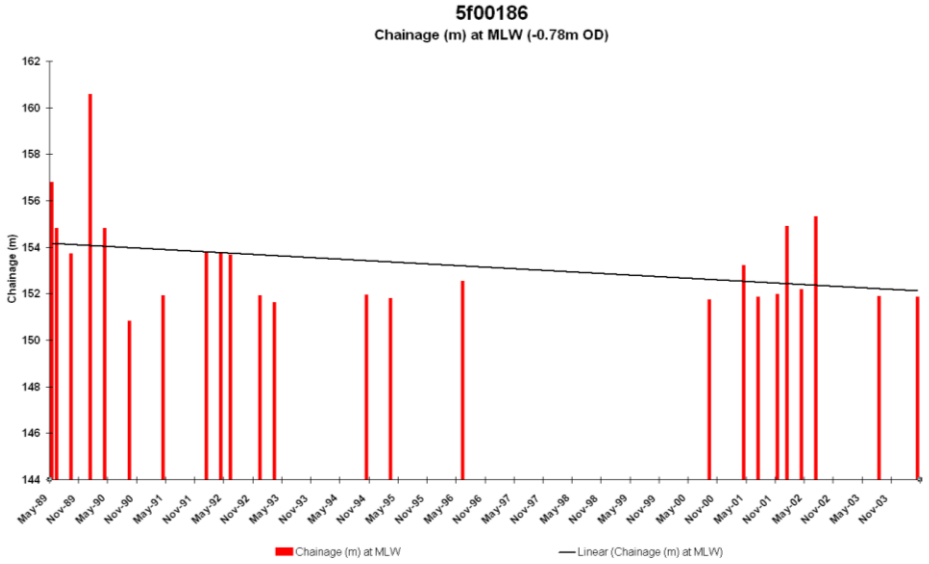
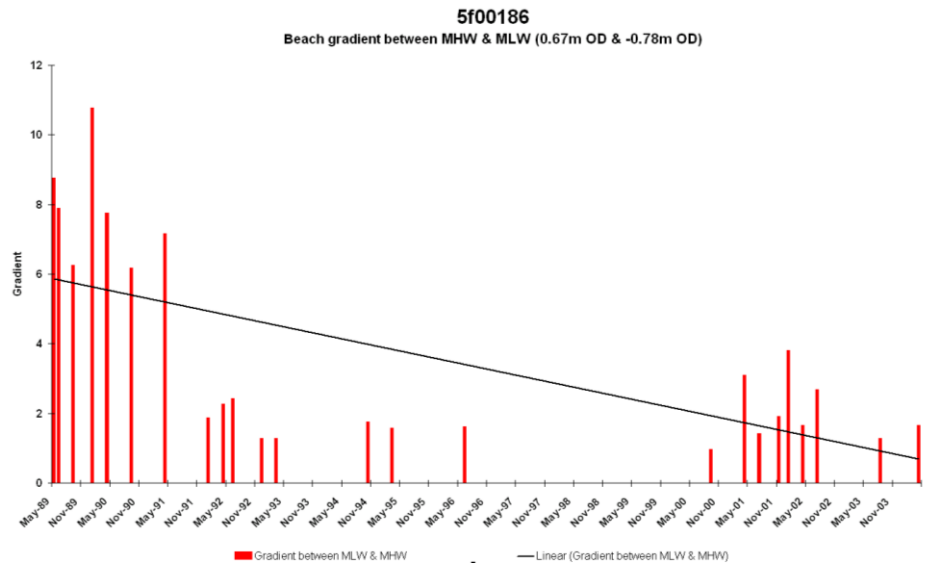


Figure D3.4 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00181


5f00186
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00186
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

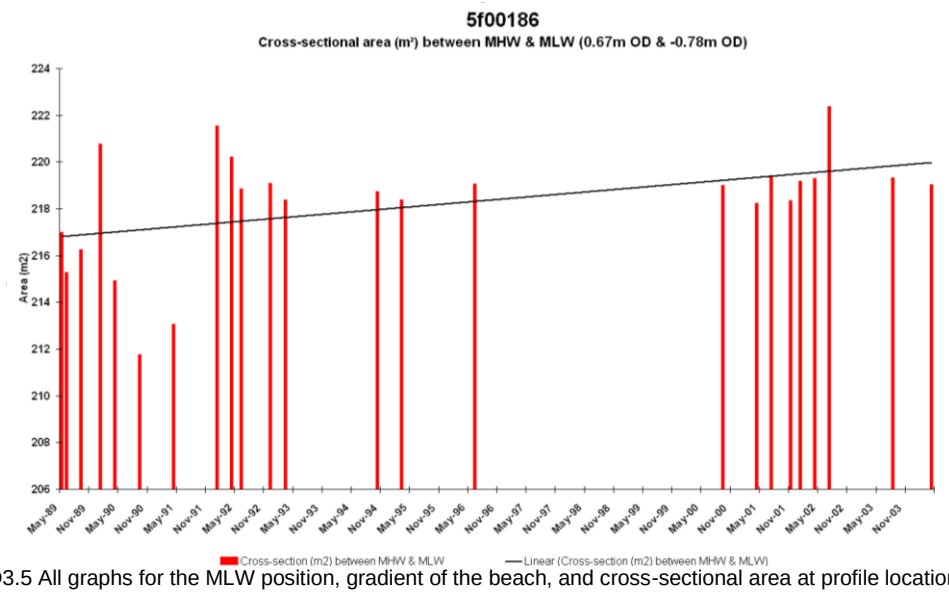
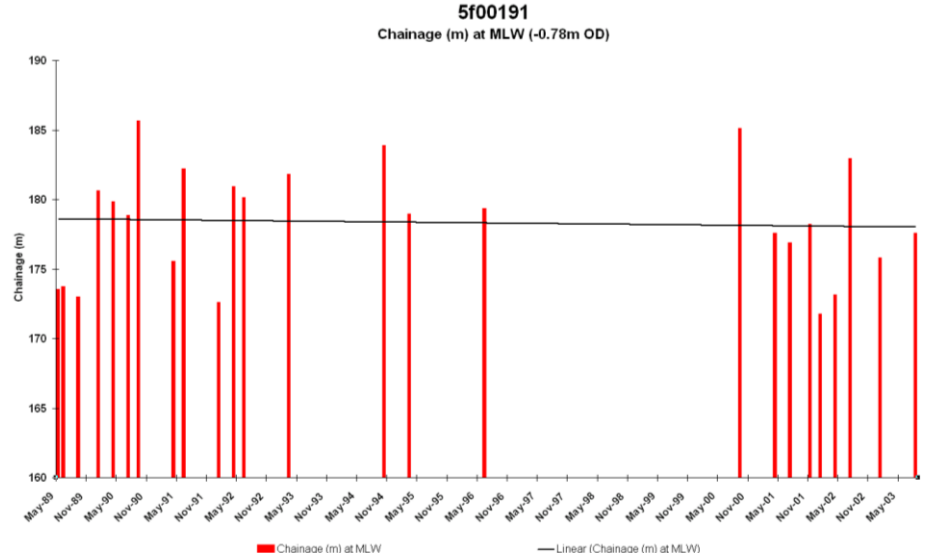


Figure D3.5 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00186



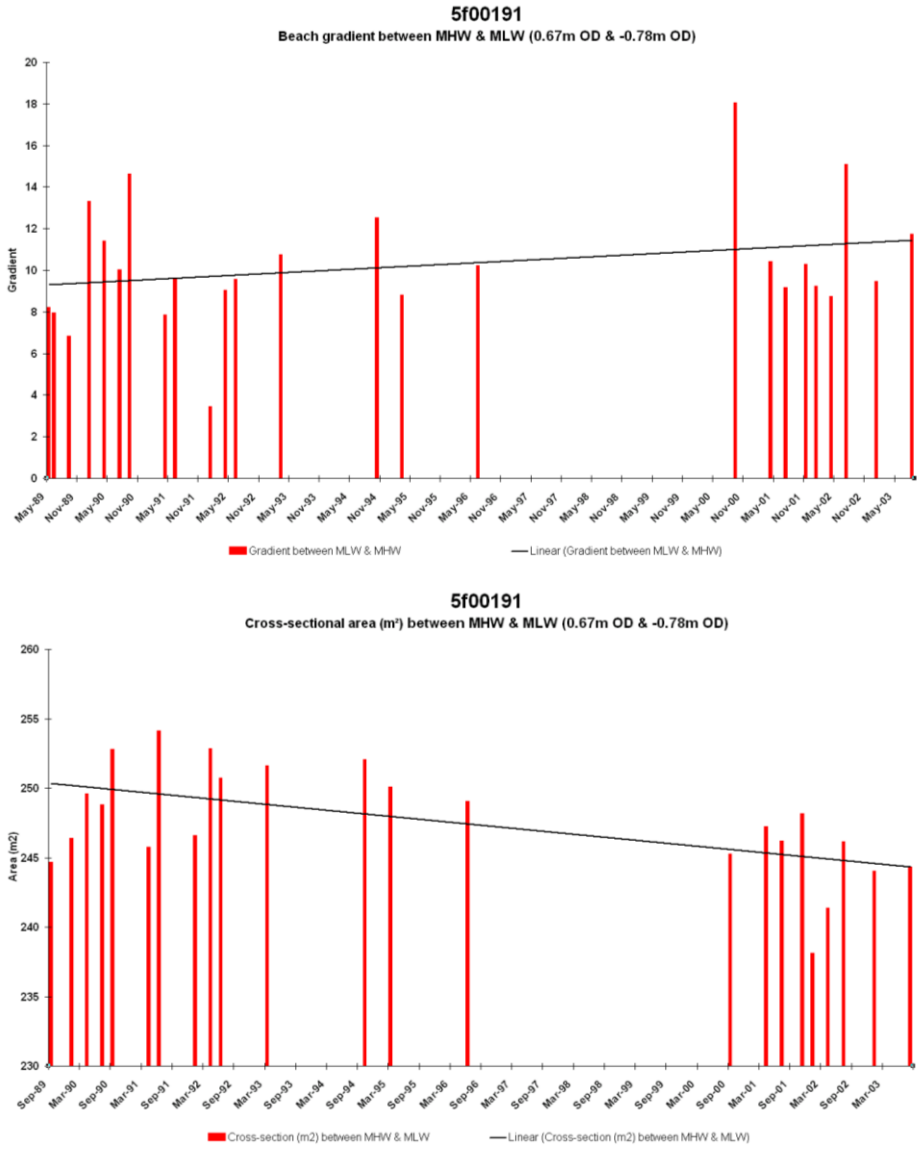
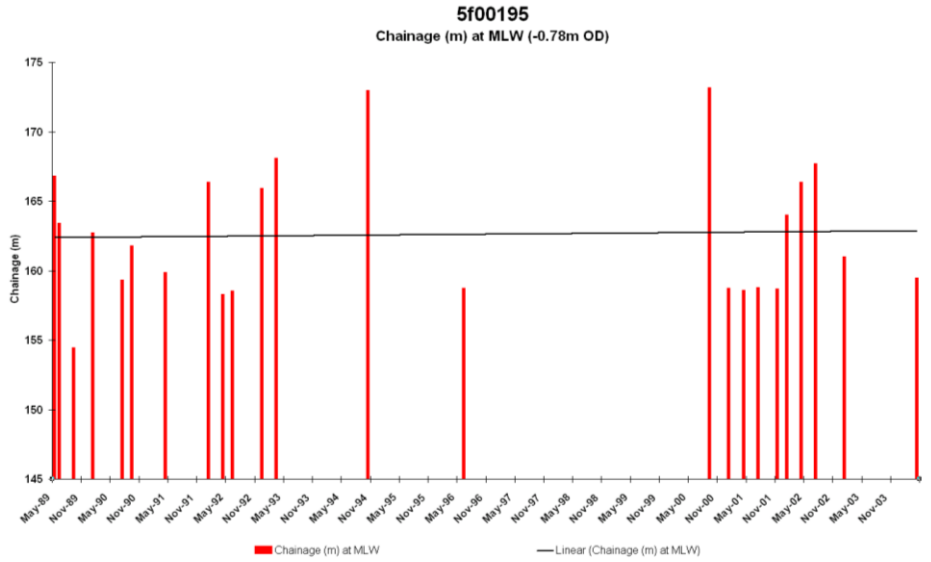
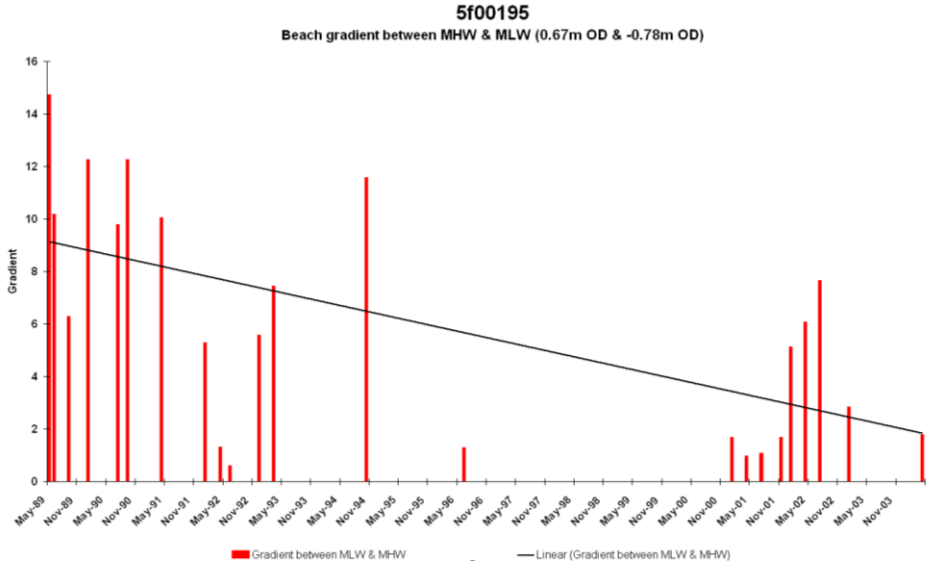


Figure D3.6 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00191


5f00195
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
175
170
165
160
155
150
145
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00195
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
16
14
12
10
8
6
4
2
0
May-89
Nov-89
May-90
Nov-90
May-91
Nov-91
May-92
Nov-92
May-93
Nov-93
May-94
Nov-94
May-95
Nov-95
May-96
Nov-96
May-97
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

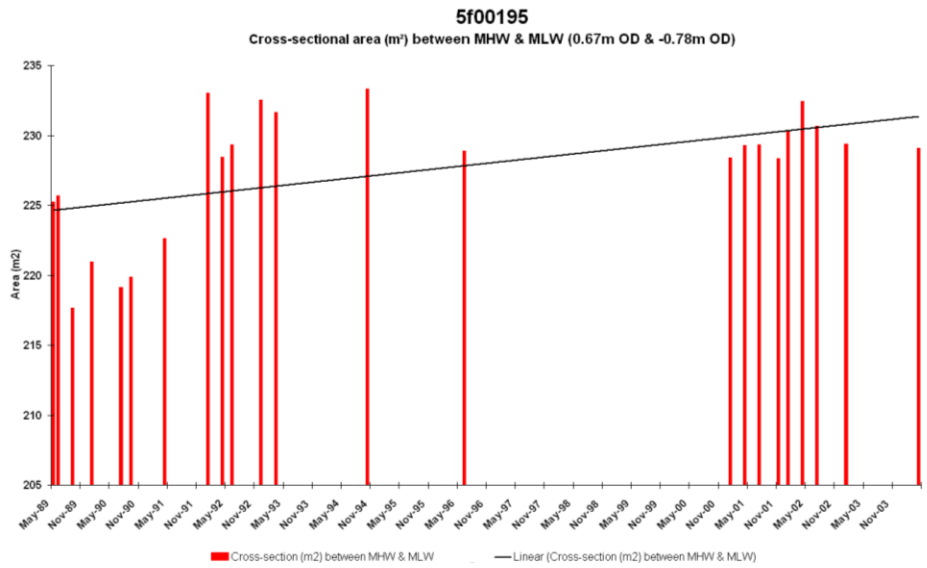
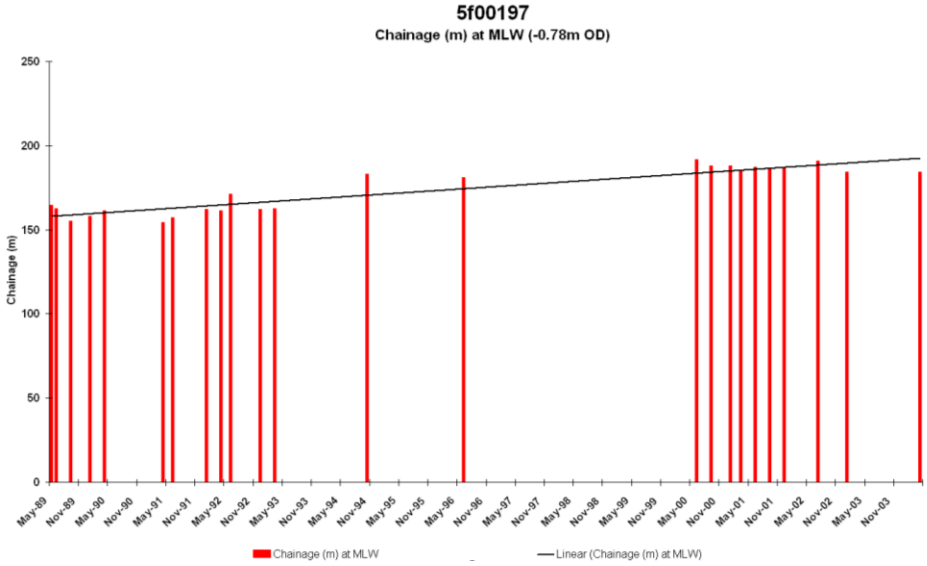


Figure D3.7 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00195



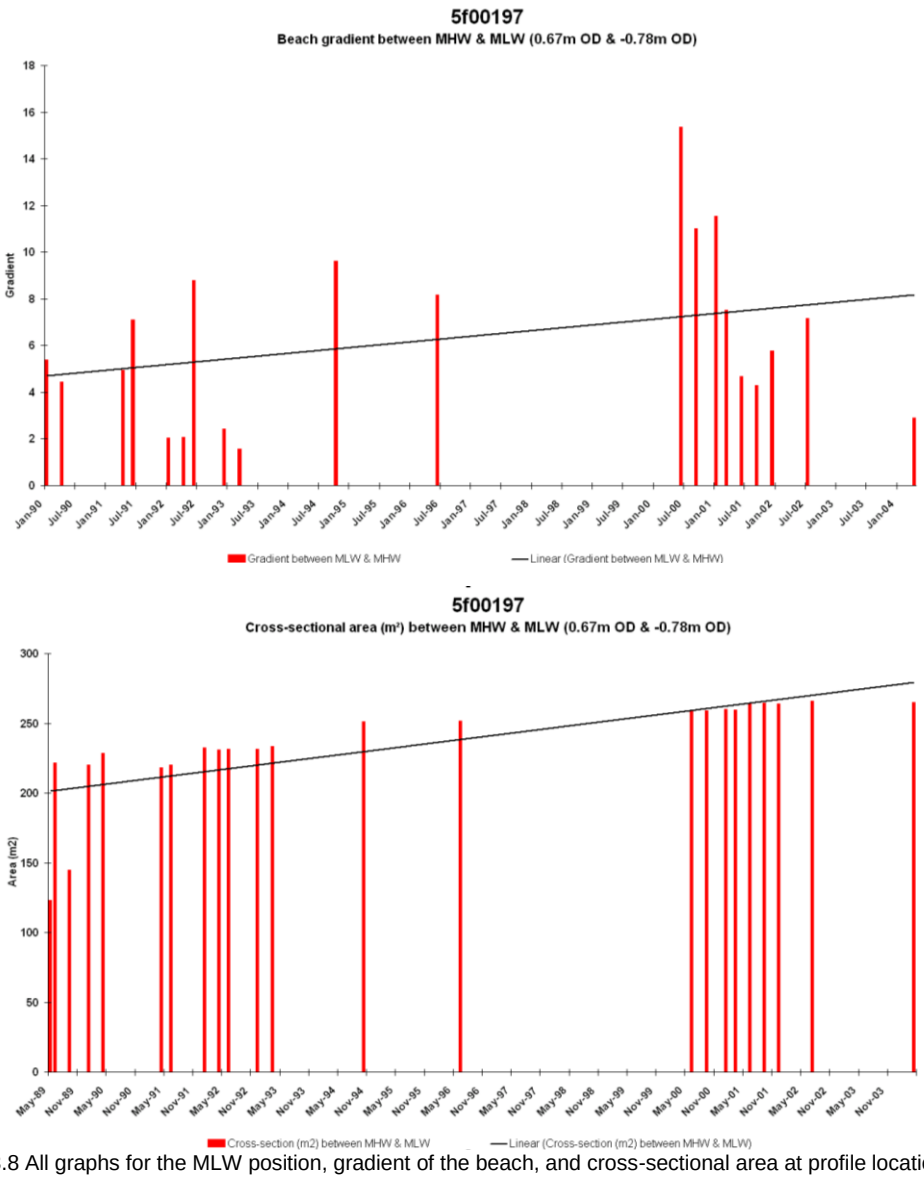
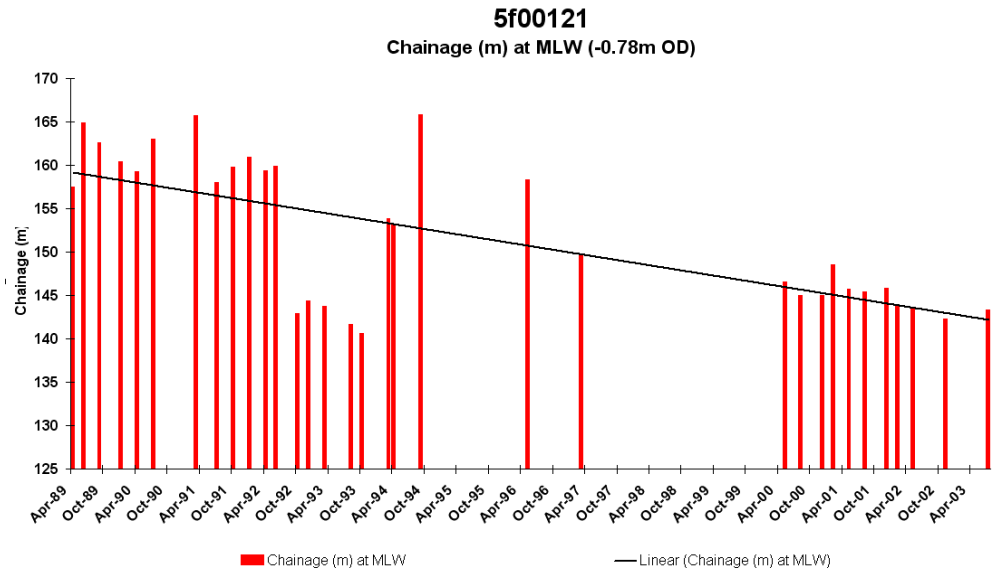
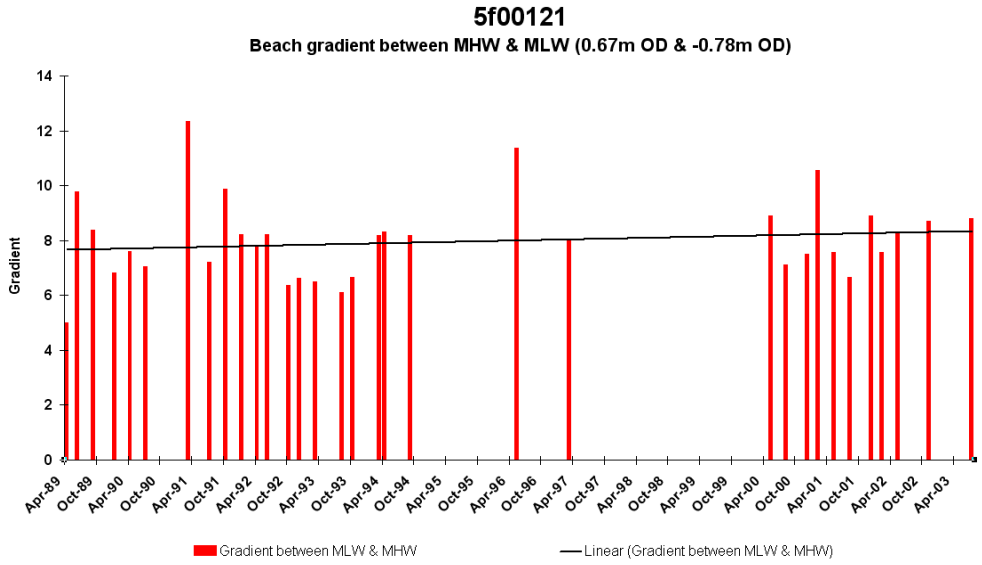


Figure D3.8 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00197

CBY5


5f00121
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
170
165
160
155
150
145
140
135
130
125
Apr-89
Oct-89
Apr-90
Oct-90
Apr-91
Oct-91
Apr-92
Oct-92
Apr-93
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
Apr-96
Oct-96
Apr-97
Oct-97
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00121
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
14
12
10
8
6
4
2
0
Apr-89
Oct-89
Apr-90
Oct-90
Apr-91
Oct-91
Apr-92
Oct-92
Apr-93
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
Apr-96
Oct-96
Apr-97
Oct-97
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

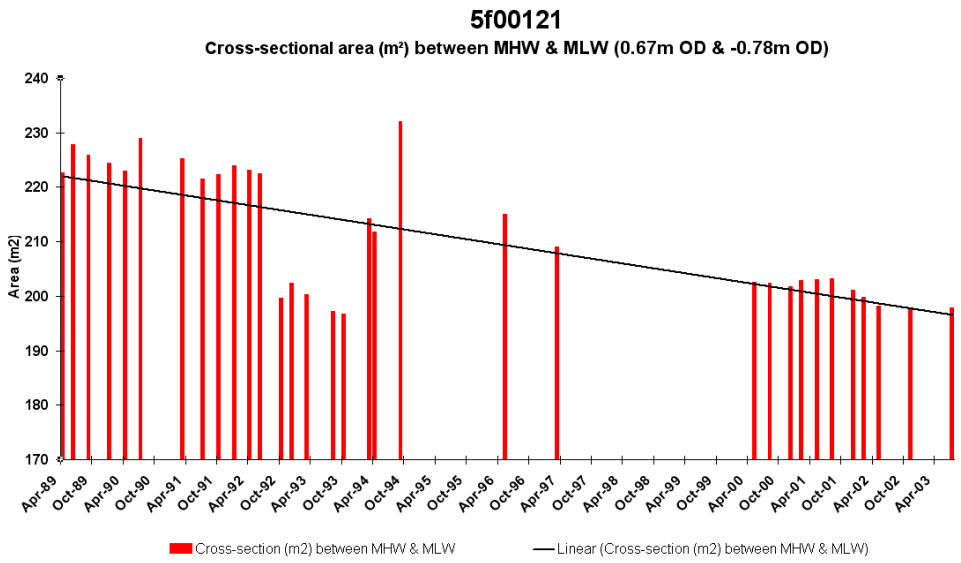
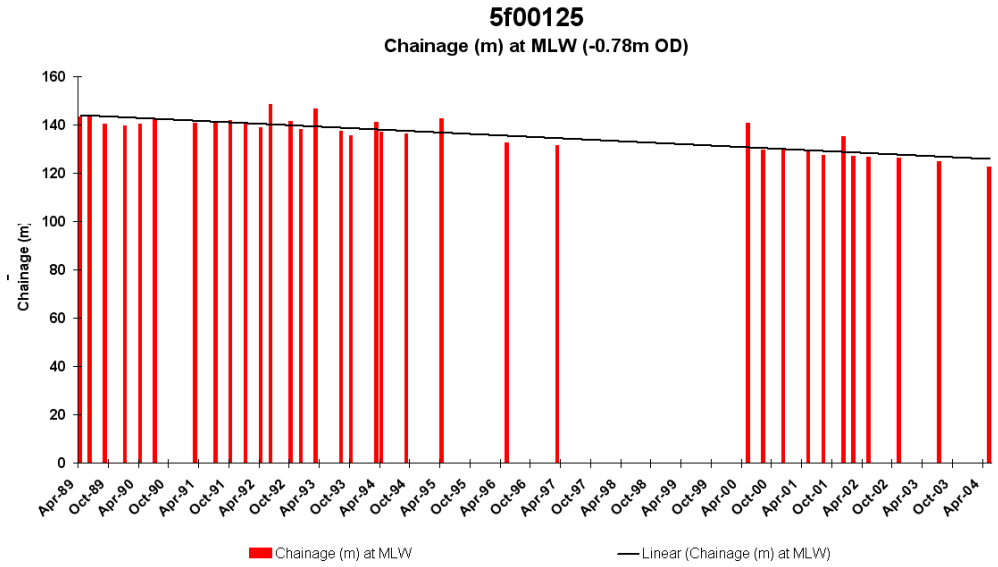


Figure D4.1 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00121



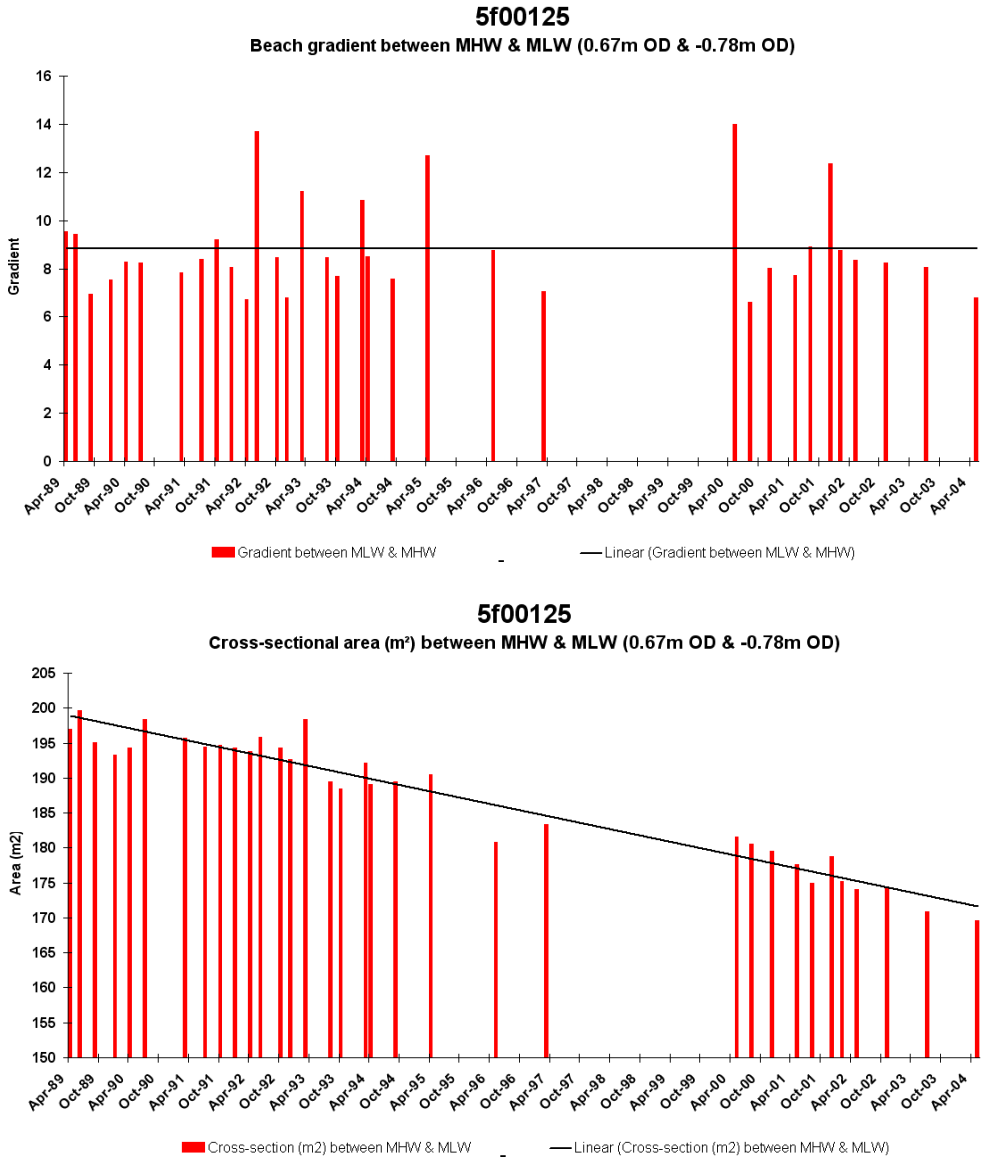
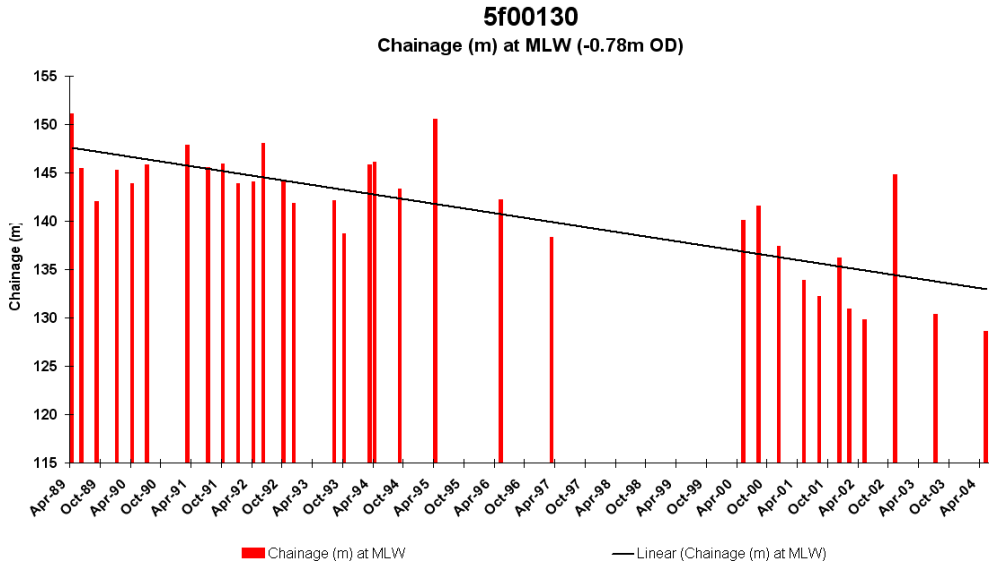
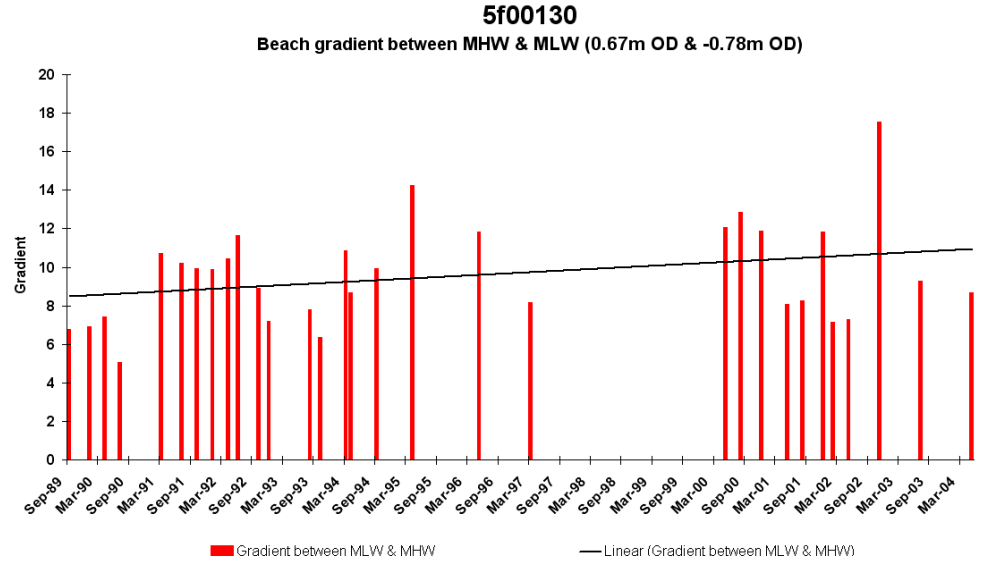


Figure D4.2 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00125


5f00130
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
155
150
145
140
135
130
125
120
115
Apr-89
Oct-89
Apr-90
Oct-90
Apr-91
Oct-91
Apr-92
Oct-92
Apr-93
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
Apr-96
Oct-96
Apr-97
Oct-97
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Apr-04
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00130
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
20
18
16
14
12
10
8
6
4
2
0
Sep-89
Mar-90
Sep-90
Mar-91
Sep-91
Mar-92
Sep-92
Mar-93
Sep-93
Mar-94
Sep-94
Mar-95
Sep-95
Mar-96
Sep-96
Mar-97
Sep-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Sep-01
Mar-02
Sep-02
Mar-03
Sep-03
Mar-04
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

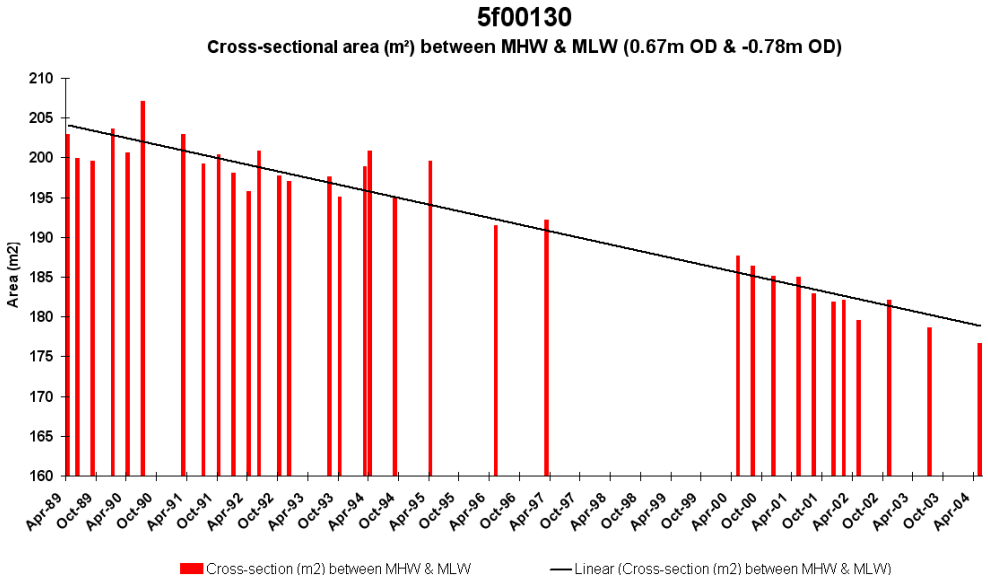
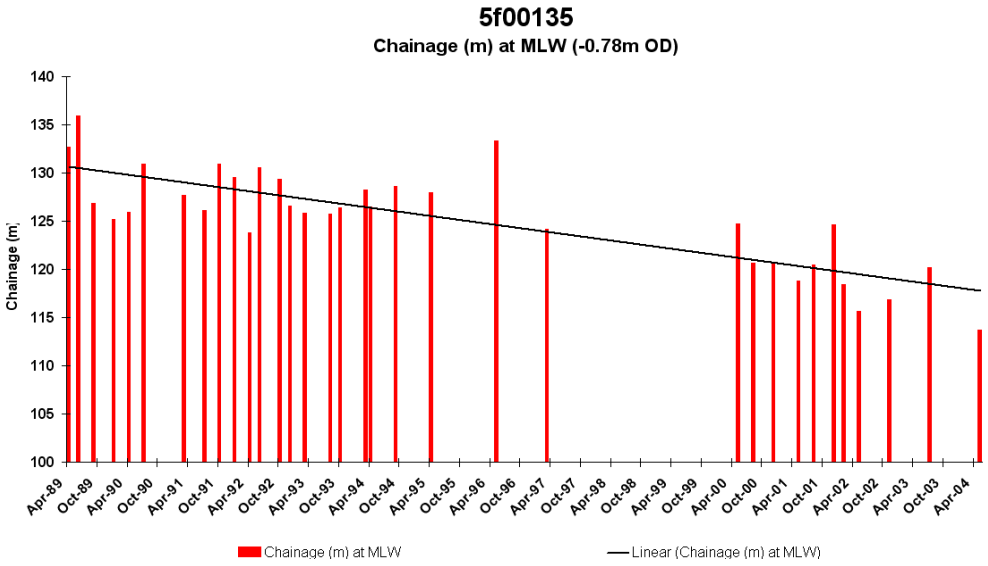


Figure D4.3 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00130



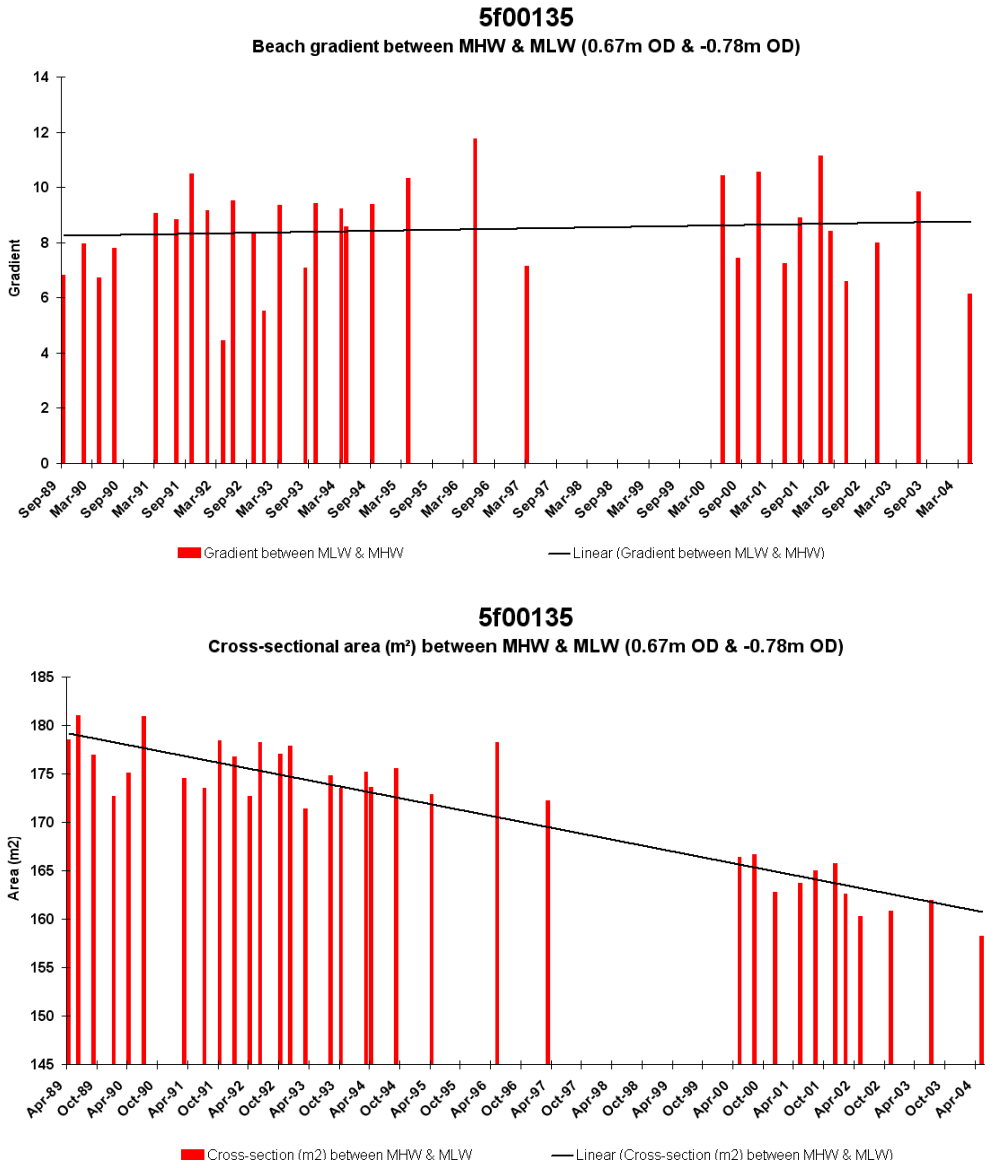
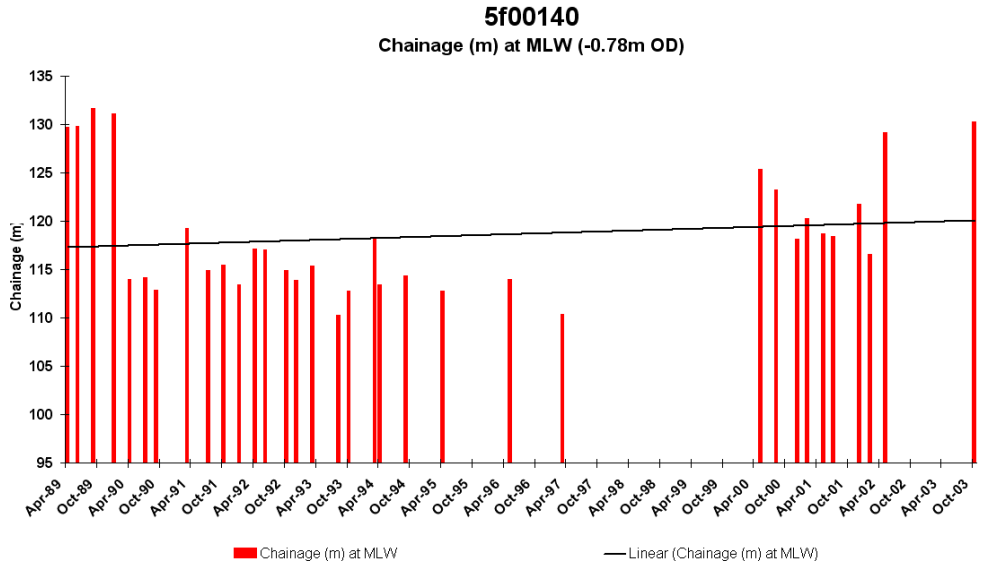
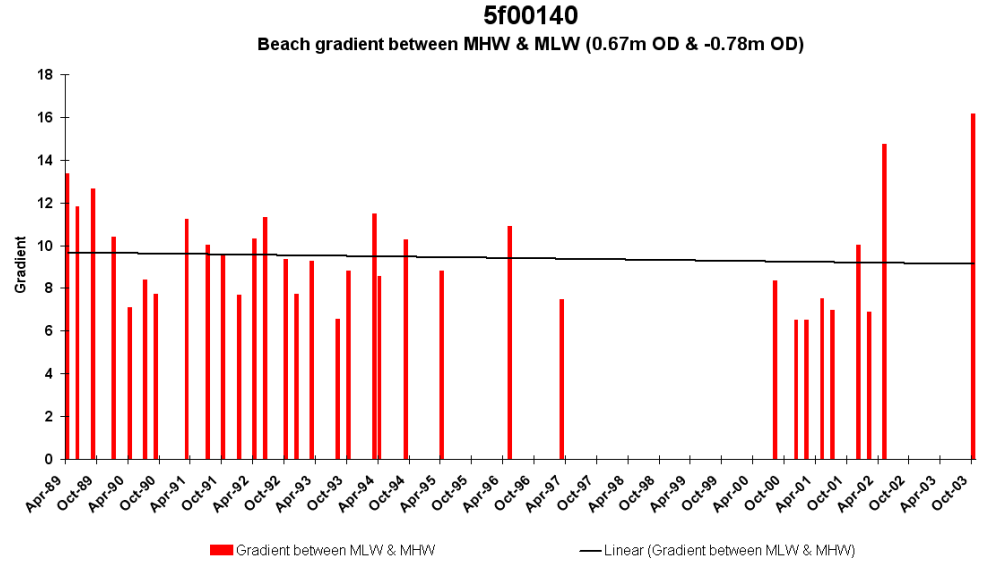


Figure D4.4 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00135


5f00140
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
135
130
125
120
115
110
105
100
95
Apr-89
Oct-89
Apr-90
Oct-90
Apr-91
Oct-91
Apr-92
Oct-92
Apr-93
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
Apr-96
Oct-96
Apr-97
Oct-97
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00140
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
18
16
14
12
10
8
6
4
2
0
Apr-89
Oct-89
Apr-90
Oct-90
Apr-91
Oct-91
Apr-92
Oct-92
Apr-93
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
Apr-96
Oct-96
Apr-97
Oct-97
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

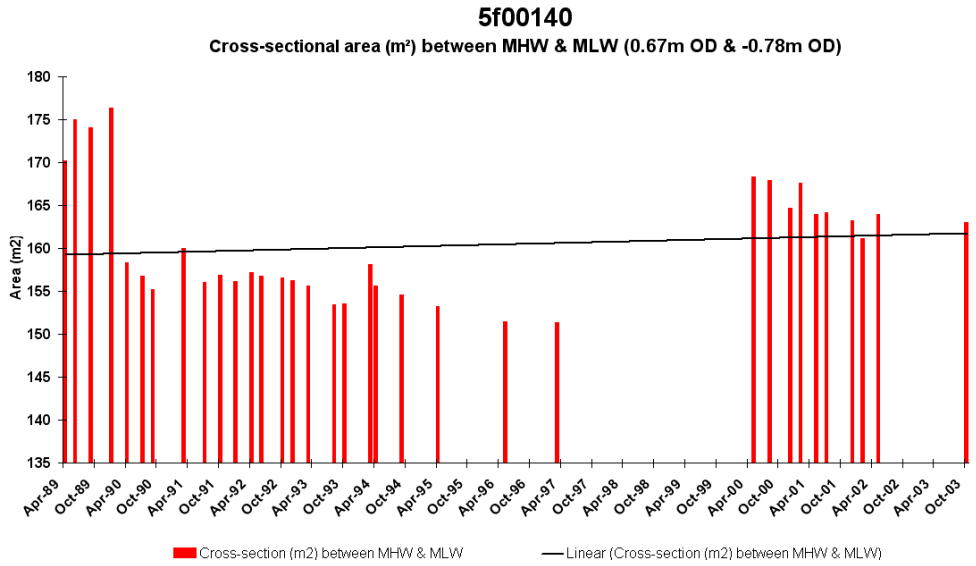
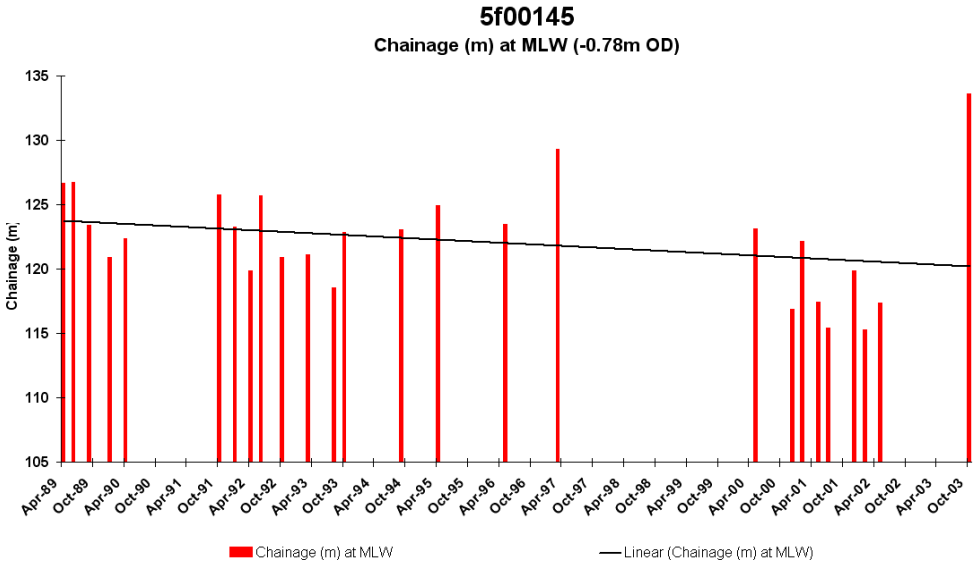


Figure D4.5 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00140



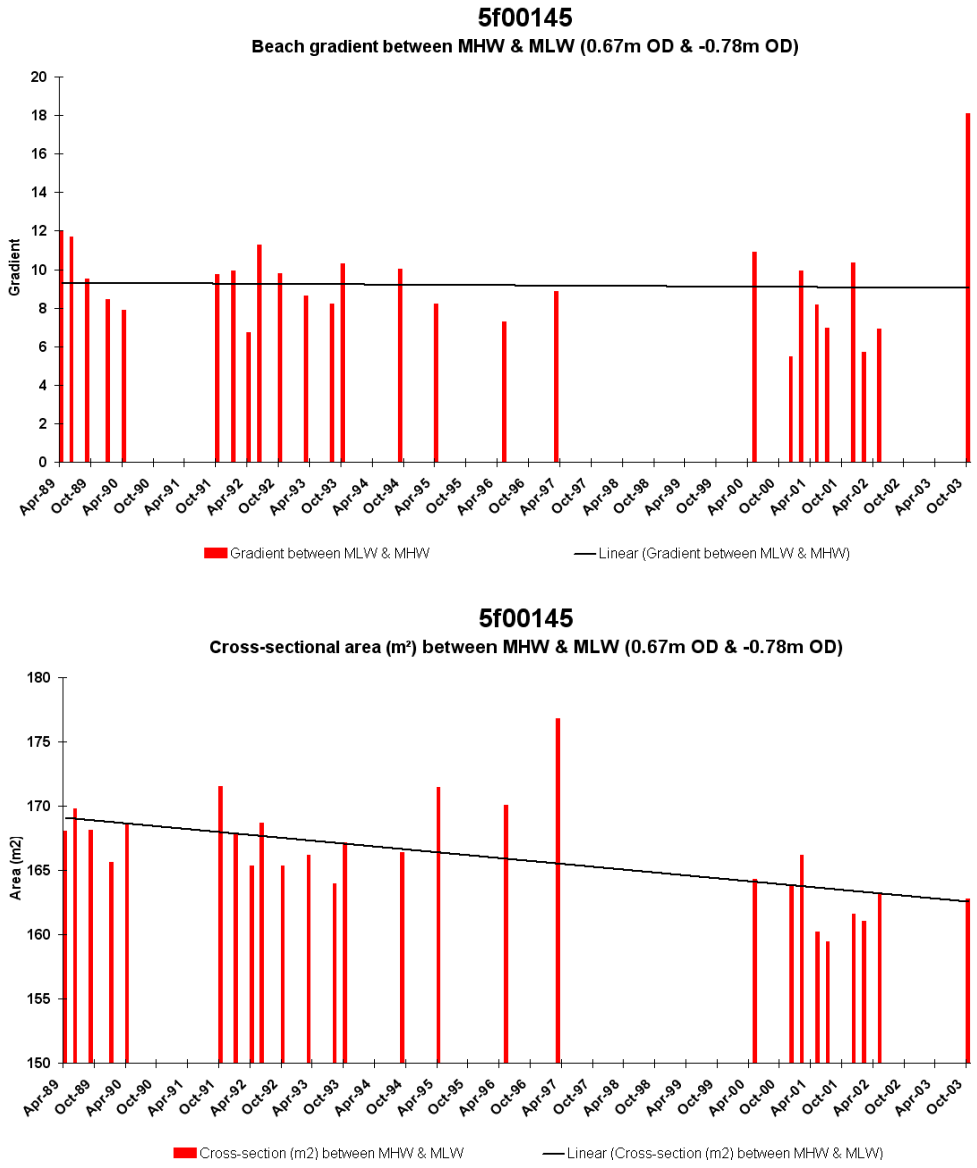
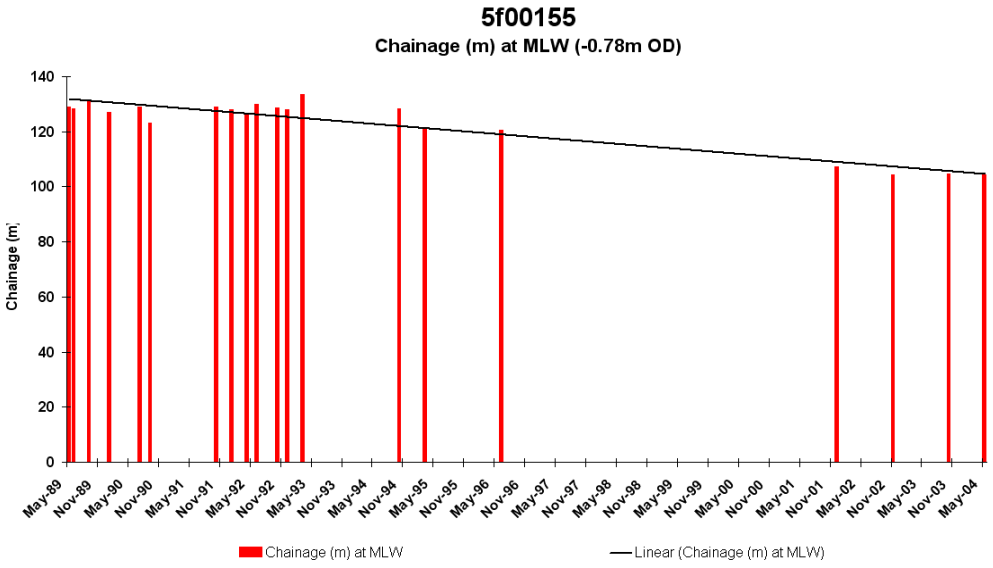
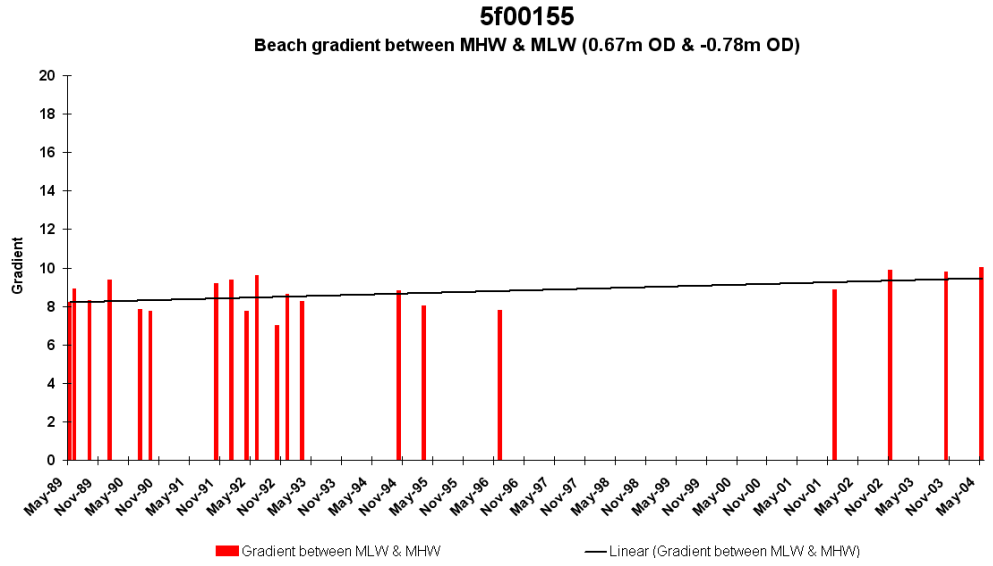


Figure D4.6 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00145


5f00155
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00155
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

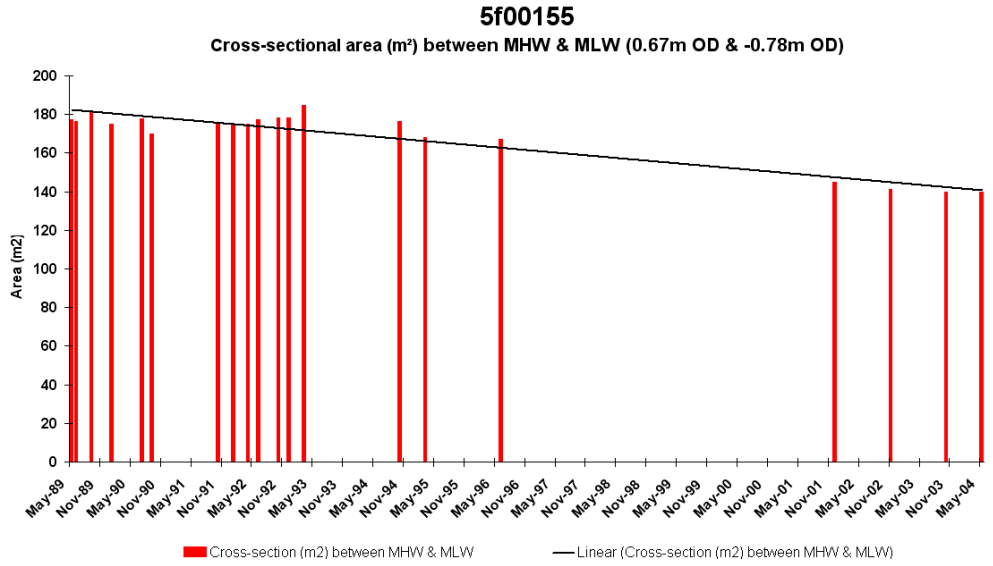
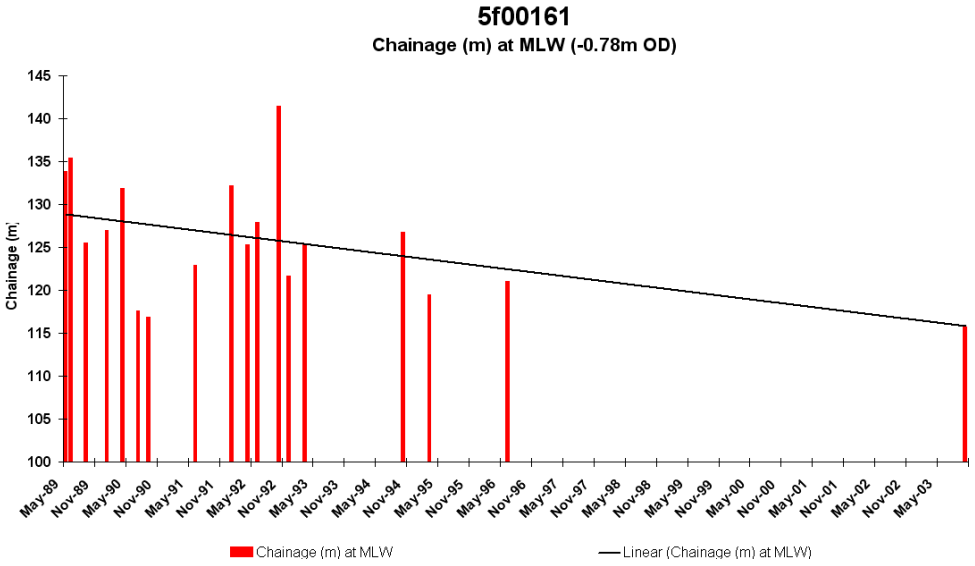


Figure D4.7 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00155



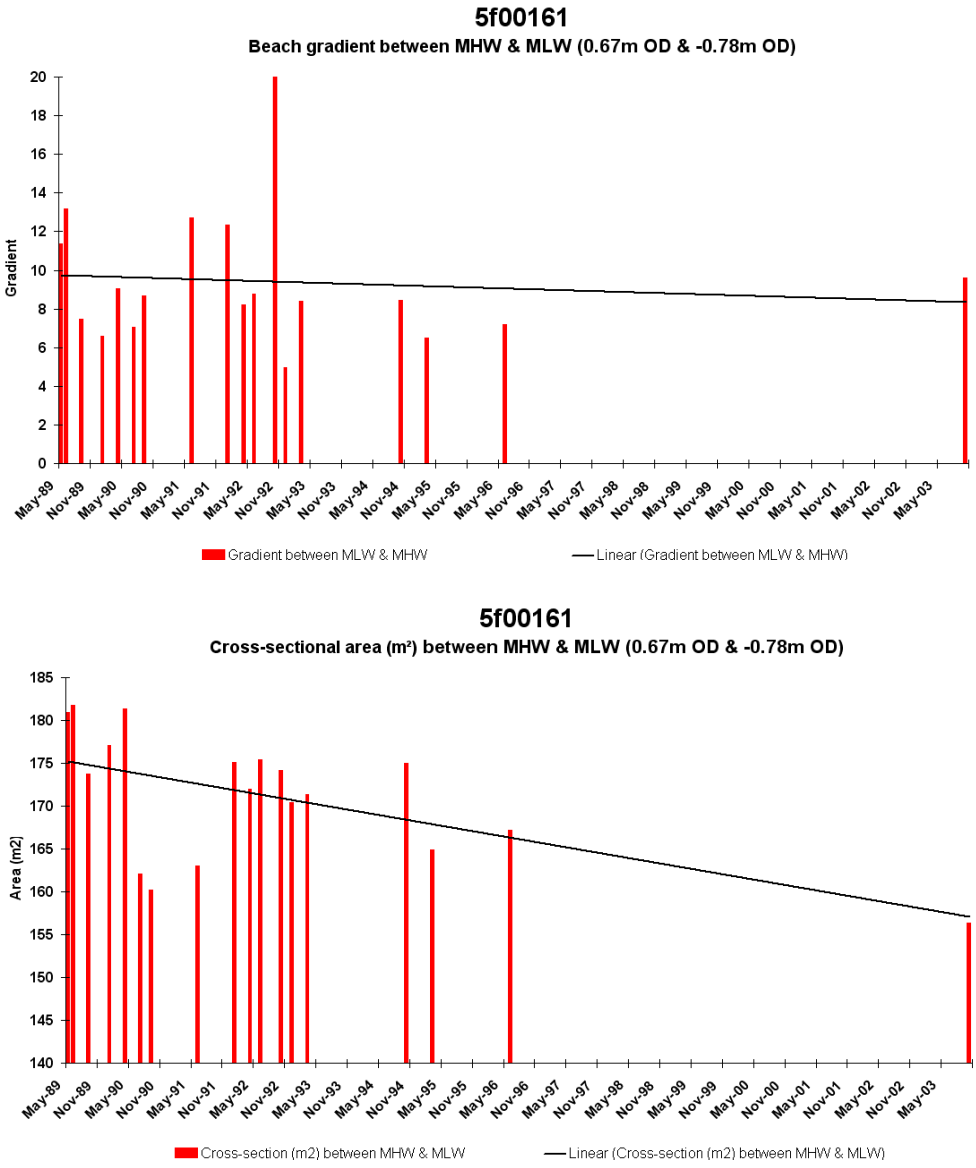
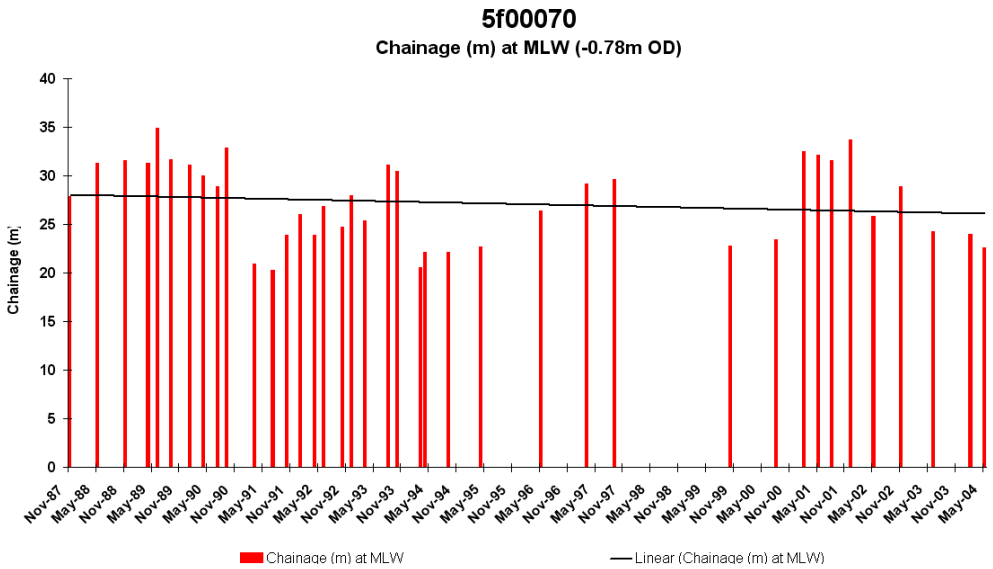
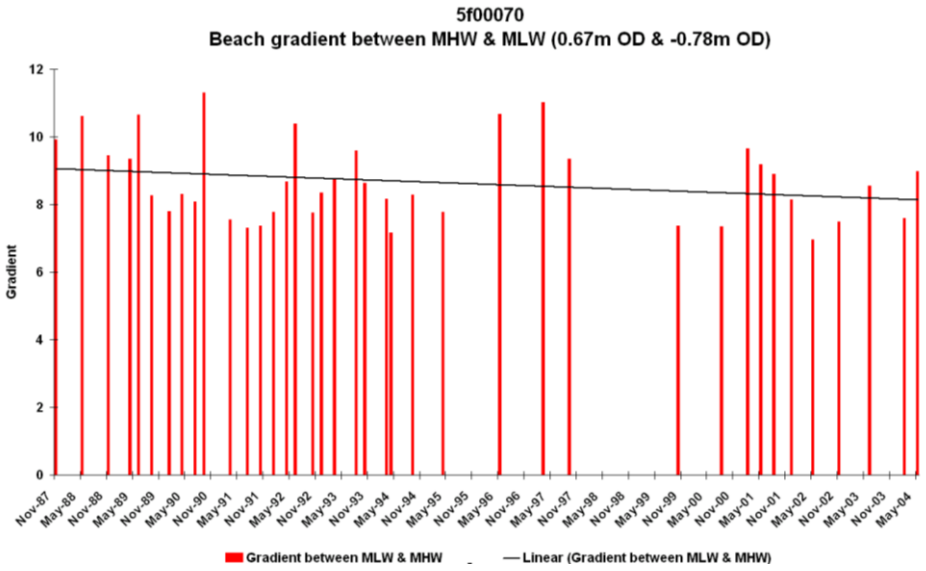


Figure D4.8 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00161

CBY6


5f00070
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00070
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

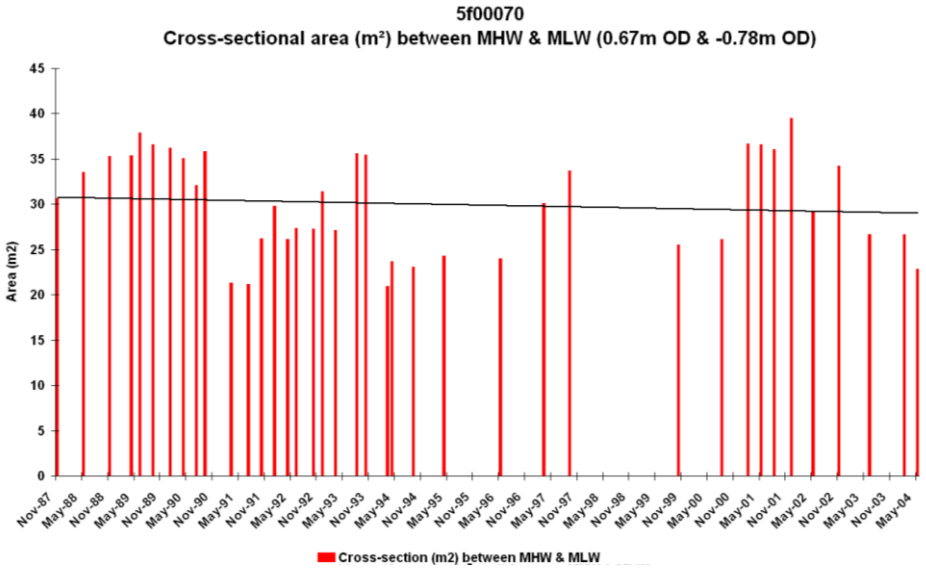
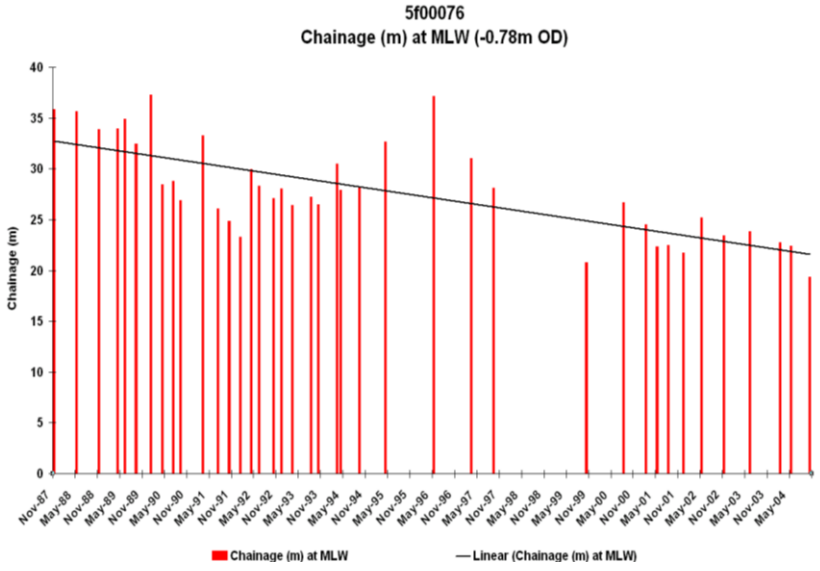


Figure D5.1 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00070



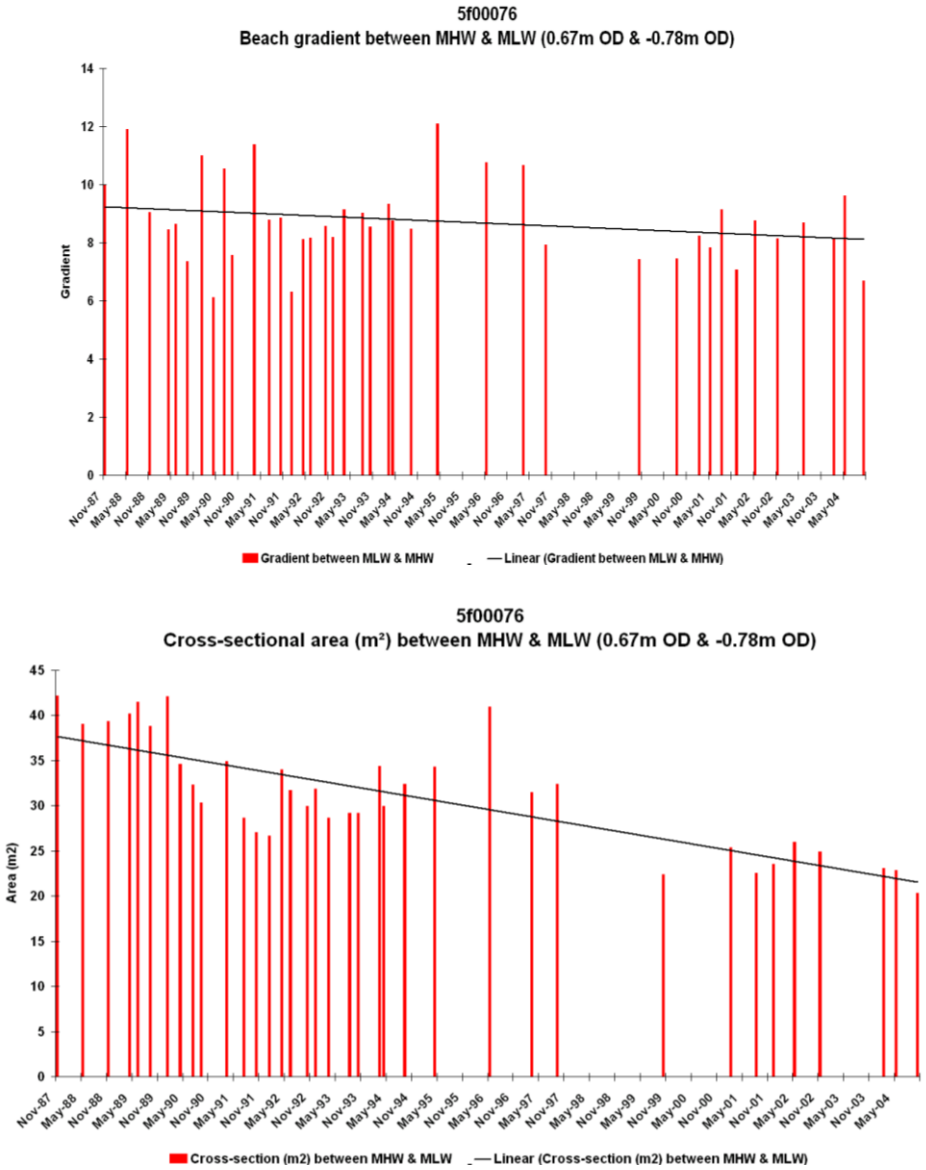
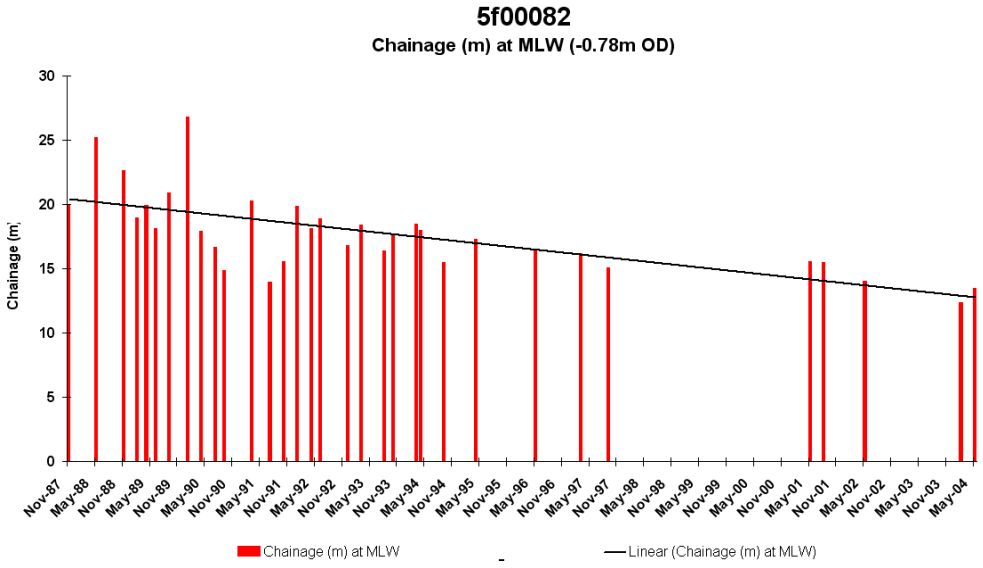
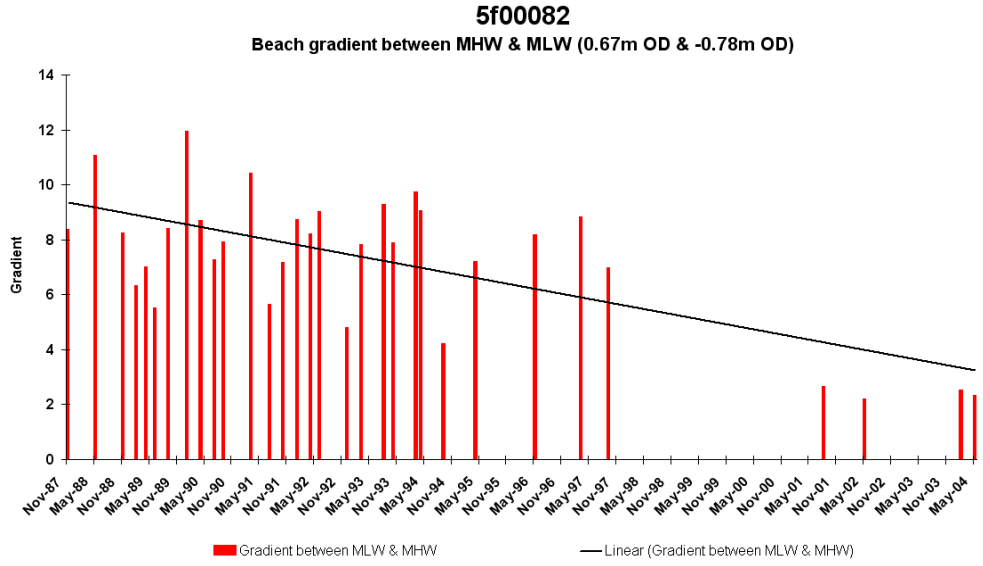


Figure D5.2 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00076


5f00082
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
30
25
20
15
10
5
0
Nov-87 May-88 Nov-88 May-89 Nov-89 May-90 Nov-90 May-91 Nov-91 May-92 Nov-92 May-93 Nov-93 May-94 Nov-94 May-95 Nov-95 May-96 Nov-96 May-97 Nov-97 May-98 Nov-98 May-99 Nov-99 May-00 Nov-00 May-01 Nov-01 May-02 Nov-02 May-03 Nov-03 May-04
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00082
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
14
12
10
8
6
4
2
0
Nov-87 May-88 Nov-88 May-89 Nov-89 May-90 Nov-90 May-91 Nov-91 May-92 Nov-92 May-93 Nov-93 May-94 Nov-94 May-95 Nov-95 May-96 Nov-96 May-97 Nov-97 May-98 Nov-98 May-99 Nov-99 May-00 Nov-00 May-01 Nov-01 May-02 Nov-02 May-03 Nov-03 May-04
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

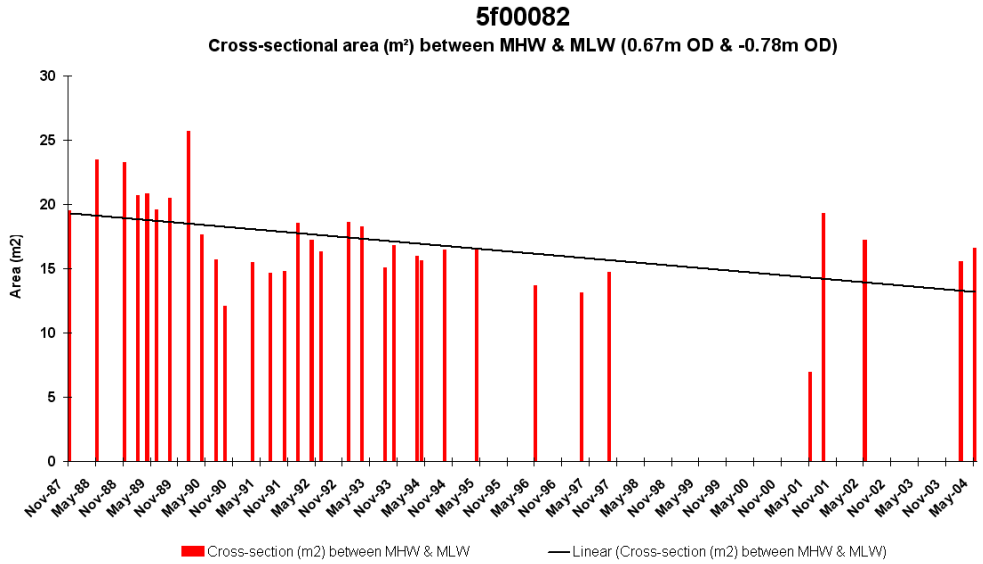
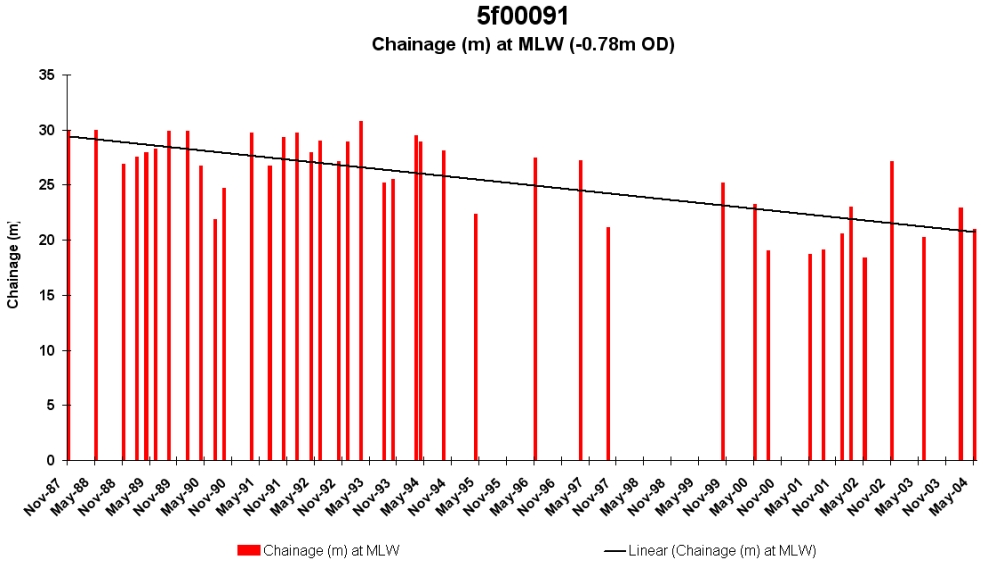


Figure D5.3 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00082



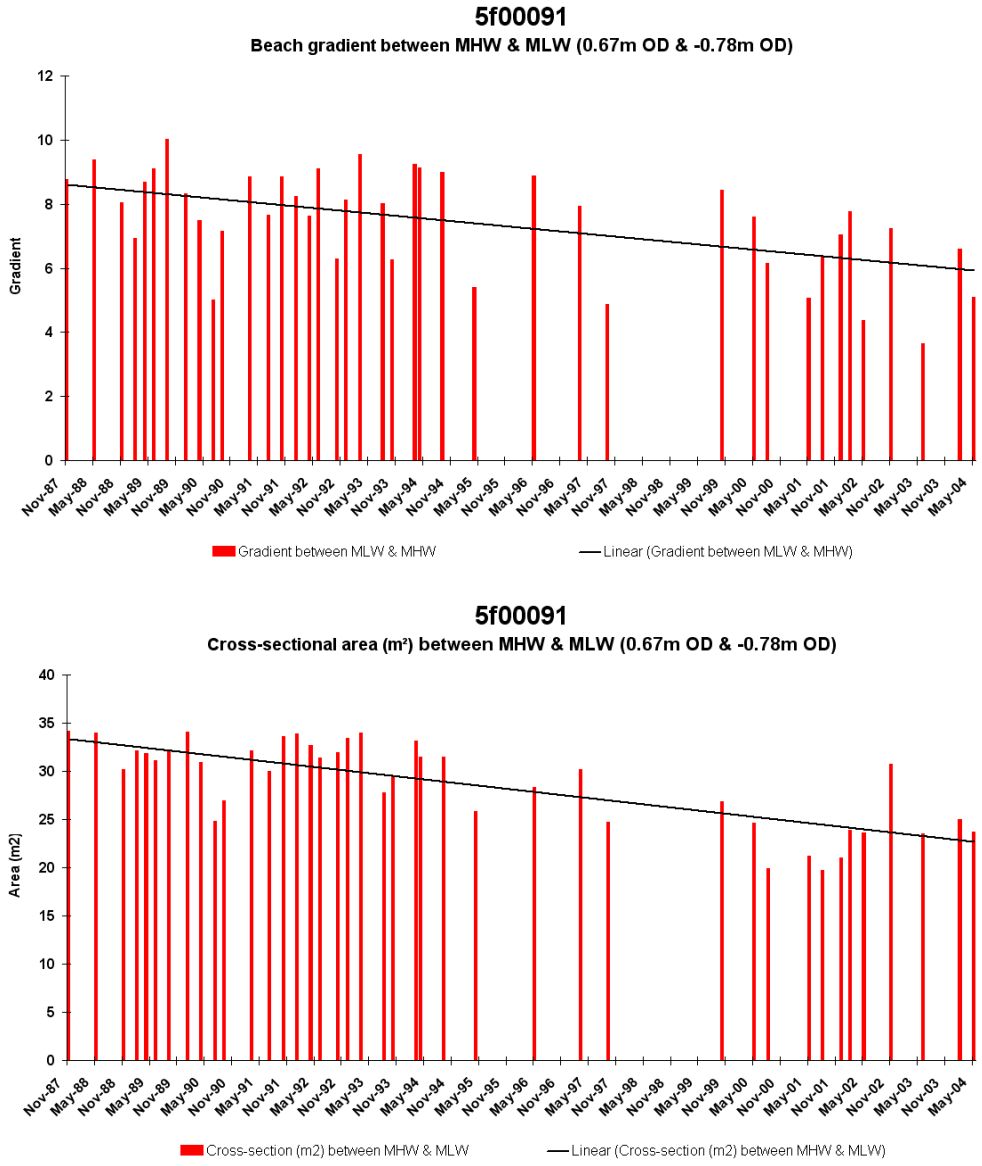
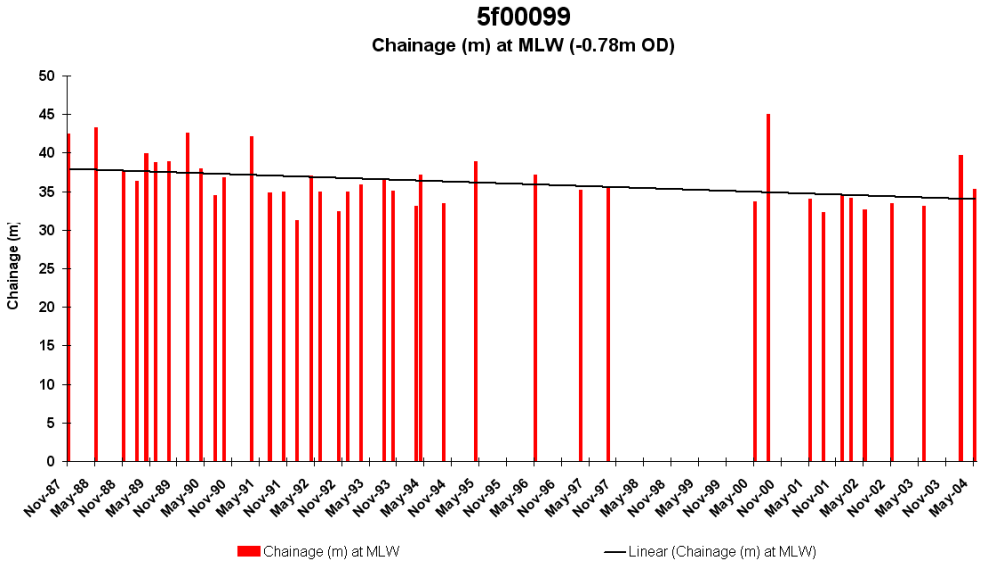
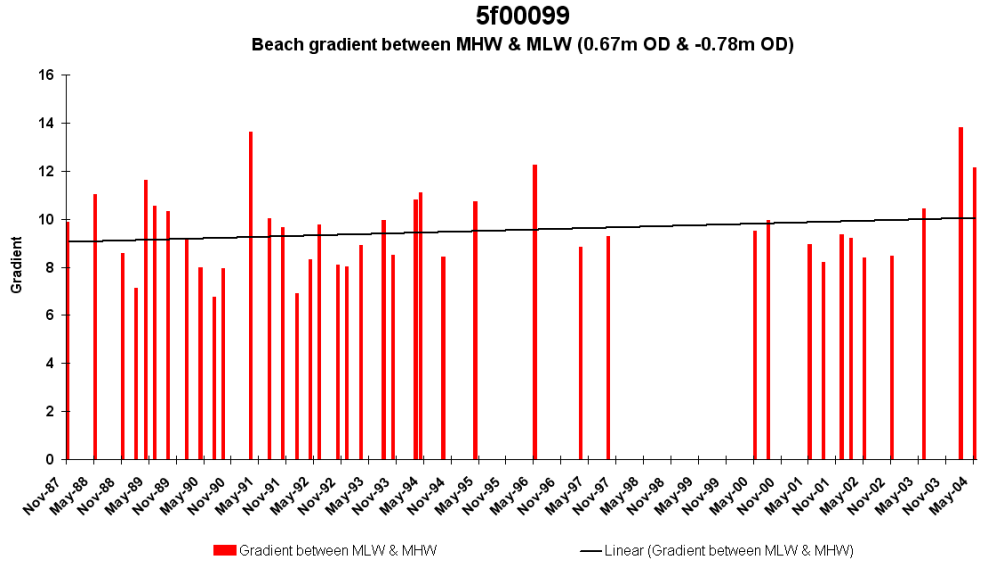


Figure D5.4 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00091


5f00099
Chainage (m) at MLW (-0.78m OD)
Chainage (m)
Chainage (m) at MLW
Linear (Chainage (m) at MLW)


5f00099
Beach gradient between MHW & MLW (0.67m OD & -0.78m OD)
Gradient
Gradient between MLW & MHW
Linear (Gradient between MLW & MHW)

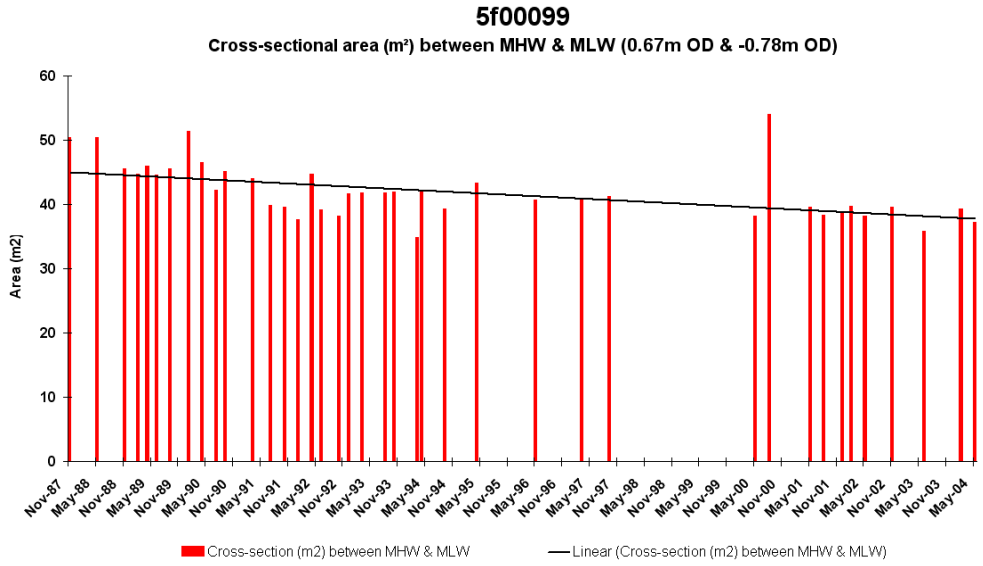
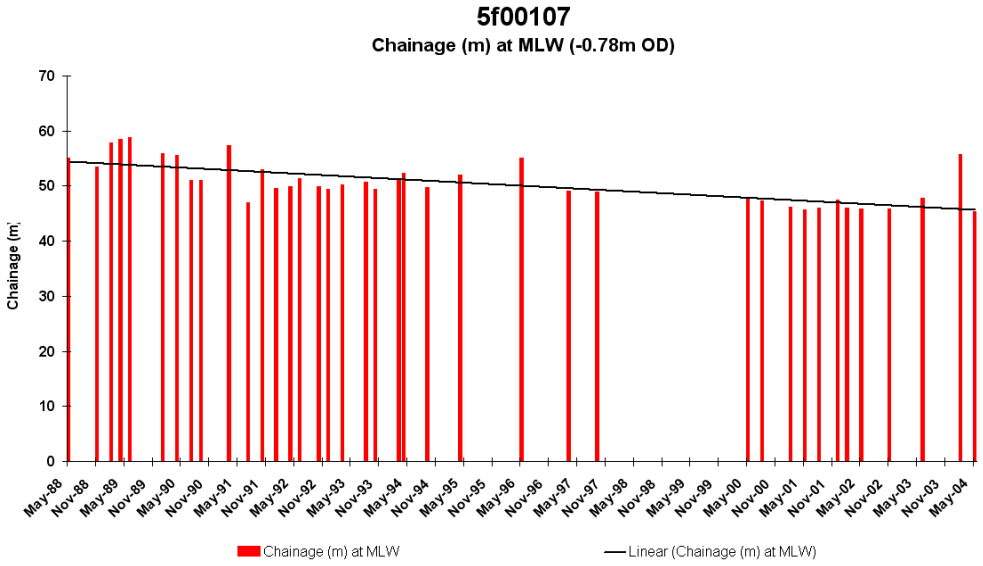


Figure D5.5 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00099



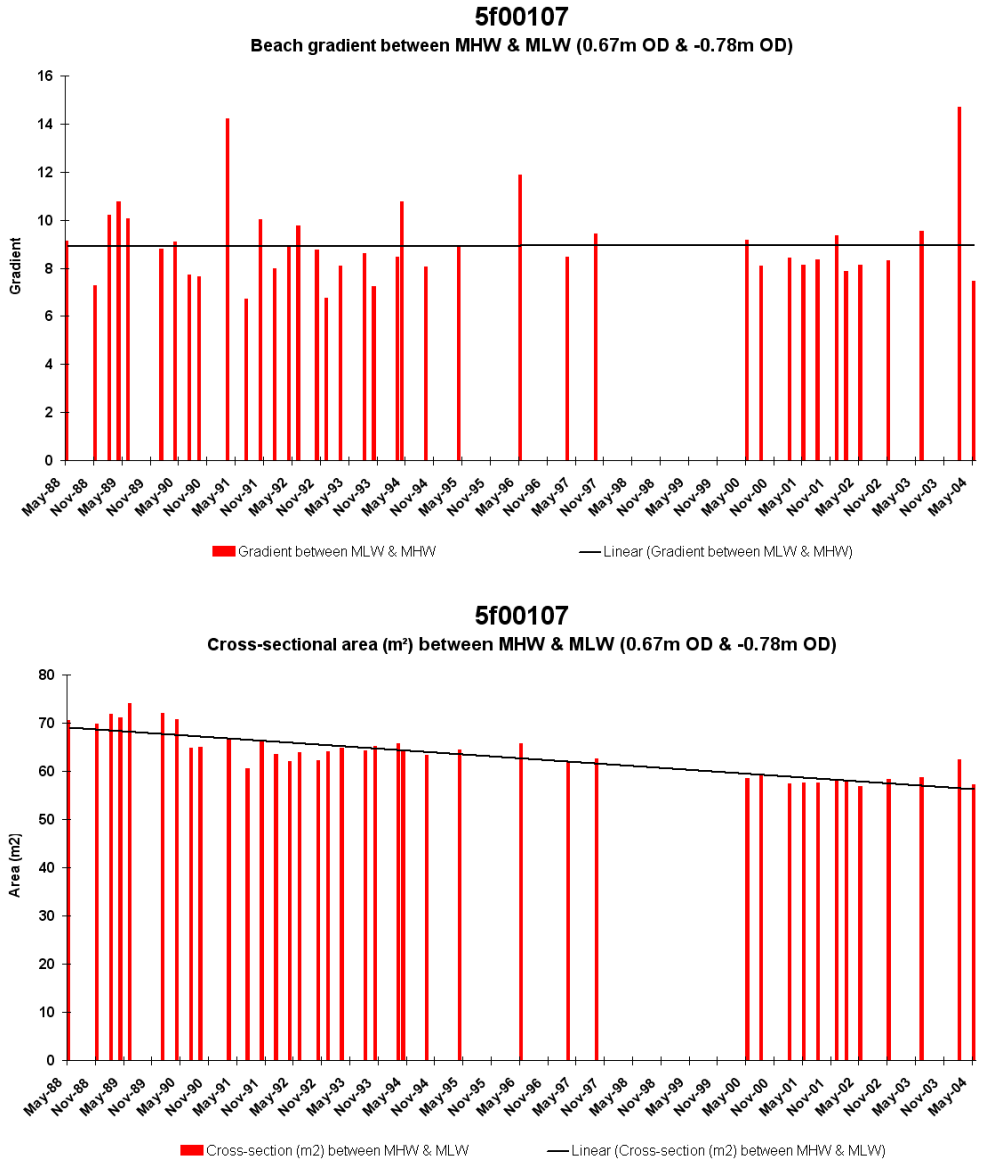


Figure D5.6 All graphs for the MLW position, gradient of the beach, and cross-sectional area at profile location 5f00107

Appendix E: Results Table

	Profile	MLW recession rate (yr-1)	Distance: MLW trendline to zero (m)	Distance: zero to structure / cliff toe (m)	Distance: MLW trendline to structure	MLW Lowest deviation from trendline	Date of last survey	Structure type / beach	Residual life expiry date (inspection)	MLW Residual life expiry date (profile) LOWER	MLW Residual life expiry date (profile) AV. TREND
UNIT	5f00070	-0.12	26	6	20	7.3	2004	Seawall	2013	**2110**	**2171**
CBY6	5f00076	-0.66	21.5	3	18.5	6.75	2004	Seawall	2023	**2022**	**2032**
	5f00082	-0.46	13	13	0	4.5	2004	Seawall	2023	**1994**	**2004**
	5f00091	-0.52	21	19	2	6	2004	Seawall / Revetment	2023	**1996**	**2008**
	5f00099	-0.24	34	3	31	5.5	2004	Beach	2023	**2111**	**2134**
	5f00107	-0.54	46	0	46	5	2004	Beach		**2080**	**2089**
UNIT	5f00121	-1.19	142.5	102	40.5	12	2004	Beach		**2028**	**2038**
CBY5	5f00125	-1.21	125	91	34	2	2004	Beach		**2030**	**2032**
	5f00130	-0.97	133	103	30	5	2004	Beach		**2030**	**2035**
	5f00135	-0.85	118	90	28	6	2004	Beach		**2030**	**2037**
	5f00140	0.19	120	92	28	8	2004	Beach		2107	2148
	5f00145	-0.24	120.5	88	32.5	6	2004	Beach		**2114**	**2139**
	5f00155	-1.82	104	72	32	6	2004	Beach		**2018**	**2022**
	5f00161	-0.906	116	113	3	10	2004	Revetment	2023	**1996**	**2007**
UNIT	5f00165	0.1404	177.5	153	24.5	4	2004	Revetment	2023	2150	2179
CBY4	5f00169	-0.6588	152.5	150	2.5	6	2004	Revetment	2023	**1999**	**2008**
	5f00175	0.0828	161.5	135	26.5	5.5	2004	Revetment	2023	2258	2324
	5f00181	-0.1428	131	131	0	2	2004	Revetment	2023	**1990**	**2004**
	5f00186	-0.138	152	151	1	3.5	2004	Revetment	2023	**1986**	**2011**
	5f00191	-0.0408	178	155	23	6	2004	Revetment	2023	**2421**	**2568**
	5f00195	0.0324	163	158	5	8	2004	Revetment	2023	2097	2158
	5f00197	2.3352	193	181	12	8	2004	Revetment	2023	2002	2009
	5f00202	-0.3492	211	181	30	7	2004	Beach		**2070**	**2090**
	5f00209	0.21	199	170	29	5	2004	Beach		2118	2142
UNIT	5f00215	0.348	213.5	185	28.5	9	2004	Beach		2060	2086
CBY3	5f00222	0.456	209	175	34	8	2004	Beach		2061	2079
	5f00225	12.5772	210	160	50	15	2004	Beach		2007	2008
UNIT	5f00229	0.2736	66	43	23	2	2004	Revetment	2023	2081	2088
CBY2	5f00257	1.0524	265	200	65	7	2004	Beach		2059	2066
	5f00261	1.2288	285	215	70	4	2004	Beach		2058	2061
	5f00264	1.4556	230	165	65	0	2004	Beach		2049	2049
	5f00272	1.0512	189	151	38	6	2004	Seawall	2023	2034	2040
	5f00276	0.2484	165	128	37	0	2004	Seawall	2013	2153	2153
	5f00280	-0.2724	126.5	85	41.5	4	2004	Seawall	2013	**2142**	**2156**
	5f00284	-1.2972	220	191	29	8	2004	Seawall	2023	**2020**	**2026**
	5f00288	-0.0408	197	148	49	8	2004	Seawall	2033	**3009**	**3205**
	5f00296	0.0888	226.5	179	47.5	5.5	2004	Seawall	2023	2477	2539
	5f00300	1.668	363	347	16	12	2004	Seawall	2023	2006	2014