

1.0 INTRODUCTION

During the months of June, July and August 1996, a team from the Department of Archaeology at the University of Edinburgh undertook an assessment of the erosion of the archaeology and the built heritage within the coastal zone of Lewis, Scotland. The linear survey ran from Aird Drollageo (NA 994 203) in the west via the Butt of Lewis to Ranish (NB 402 255) in the east, covering approximately 450 kilometres.

The survey was sponsored by Historic Scotland and the Department of Archaeology. Its primary aims (see section 2.11) were specified by Historic Scotland but in addition it will also contribute to the larger ongoing research programme to investigate the character, development and wider archaeological context of human settlement in Lewis from Prehistory to 1950. The results of this survey, listed in section 5, detail 1825 individual cultural heritage sites, 15 palaeo-environment sites and 319 geomorphic and erosion cells.

This survey has shown that 63% of the coast line of Lewis covered by this study is classed as *eroding* or *eroding to stable*. 33% is undergoing no erosion or deposition (*i.e.* it is classed as *stable*) and 4% is classed as *stable to depositing* or *depositing*. The remaining 1% is classed as *eroding* and *depositing* at the same time ( this category accounts for beaches undergoing longshore drift)

Of the cultural heritage and palaeo-environment sites recorded in this survey, 38.5% are recorded as *eroding* or *eroding to stable*. 59.5% are *stable* and 1.2% are *stable to depositing* or *depositing*. 0.8% are recorded as *eroding* and *depositing*.

These results indicate that 699 *eroding* sites (38.5%) are to be found over 63% of the coast line and 1087 *stable* sites (59.5%) are to be found in 33% of the coastline. Only 26 sites (1.2%) were recorded as being in locations where deposition is occurring (accounting for 4% of the coast line). 0.8% of the sites recorded are located over 1% of the coast line that are *eroding* and *depositing*.

2.0 COASTAL EROSION ASSESSMENT (LEWIS)

2.1 PROJECT BACKGROUND

The wider research programme underway on Lewis, The Callanish Archaeological Research Project (CARP), following the acquisition of Callanish (now Calanais) Farm by the University of Edinburgh in 1985. The initial emphasis of research concentrated on later prehistoric settlement on the Bhaltois Peninsula and research into ancient agricultural productivity under the direction of Professor Dennis Harding. Field work included field survey on the Bhaltois peninsula (Armit 1995) and the excavation of three Later Prehistoric monument types, a wheelhouse complex at Cnip, an island dun at Loch Bharabhat and a broch tower within the machair plain around Loch na Berie (Harding and Armit 1990). After a break of 3 years (1990-1993), a number of similar research projects have been set up with a view to maintaining integration within the wider research programme.

In 1993 the West of Lewis Landscape Project (WLLP) started with the wider intention of investigating the chronology of human settlement from the Neolithic to the Post-Medieval. This was initiated by carrying out a test pitting survey in advance of the development of the Calanais Visitor Centre. The project involved intensive field survey of all archaeological dating prior to late 19th century within an area 4 kilometres by 10 kilometres stretching to the east of Calanais. This area is dominated by blanket peat and known as the 'blacklands' (Coles 1993; Coles *et al.* 1994). Limited excavations of a number of site types of various dates followed, from Neolithic sub-soil features adjacent to the Calanais Stones to sheilings in the rough grazing along the coast and in the 'blacklands' of the interior (Coles and Rees 1994). Excavations at the broch tower in Loch na Berie were also resumed during the summer of 1993

In 1994, The Garenin Landscape Survey was set up to investigate the settlement of Garenin through intensive field survey and limited excavation. This project aims to put the on-going restoration of a number of blackhouses in the centre of the township into their archaeological context (Burgess *et al.* 1994, Burgess and Gilmour 1995) and has led to the trial excavations of features of all periods including blackhouses, illicit stills, a corn kiln and a promontory enclosure.

In 1995, The Uig Landscape Survey was initiated to investigate the human settlement of Aird Uig, the headland adjacent to the Bhaltois Peninsula. An intensive field survey in the initial season (Burgess and Church 1995) was followed by selective excavation of certain settlement types in the

following season (Burgess *et al.* 1996a, 1996b, 1996c, 1996d). A component of the initial field survey was a coastal erosion assessment of the archaeology in the 50 metre strip around Uig sands (Burgess and Church 1996) and a re-assessment of the sites examined by Dr Ian Armit during his survey of Valtois in 1990 (Armit 1996).

It is from this background of research that the following linear survey of the coastal zone developed. The results from this survey will be invaluable in the future analysis and synthesis of the other research projects and as such this report should be viewed as being part of a wider survey and research strategy rather than a separate entity.

The survey results will also form part of a much wider programme undertaken by Historic Scotland to assess the threat of coastal erosion to archaeology and the built heritage around Scotland. Patrick Ashmore first identified the need for an integrated and consistent approach to recording this threat, stressing the importance of recording not only the position and state of the monuments but also identifying the wider erosion and geomorphic units in which the monuments were located (Historic Scotland, 1994). The national strategy for assessing the coastal erosion threat was to sponsor or commission a number of linear surveys of manageable length to a variety of archaeological bodies who would base their methodology on the set procedures and guidelines outlined by Historic Scotland's *Archaeology Procedure Paper 4. Coastal Zone Survey* (1996).

These results would then be assessed against the wider national erosion and geomorphic framework resulting from the study of coastal cells currently being carried out by H R Wallingford. Regional and national strategies could then be determined for the management and response to this threat. Surveys already completed include the north coast of the Forth estuary (Burgess and Robertson 1996), the south coast of the Forth estuary (James 1996), part of the west coast from Ullapool to Lochinver (Long 1996) and the Scottish part of the Solway Firth from Mull of Galloway to the bridging point of the River Sark (Cressey and Toolis 1997).

A linear survey which concentrated on prehistoric archaeological sites in Lewis was also undertaken in 1979 (Cowie 1997) which has direct bearing on the analysis and synthesis of the survey results from this report. Despite the methodology being exclusively site specific with little regard given to the wider erosion and geomorphic units, the results from both surveys can be compared to provide limited time depth for specific sites and areas under threat from coastal erosion.

### 2.1.1 *Project aims*

The primary aims of this project have been dictated by Historic Scotland (the primary sponsor) to ensure the final report provides data conforming to the *Archaeology Procedure Paper 4. Coastal Zone Survey* (1996). These are;

- to locate all cultural heritage sites and sites of palaeo-environment interest within the 50 metre coastal zone defined by Historic Scotland (1996, p3) and assess their erosion state on a site-specific and wider geomorphic scale.
- to utilise the resulting data to design and evaluate future management strategies concentrating on the frameworks for monitoring, detailed survey, limited sampling and full excavation.

Secondary aims stem from the ongoing research interests of the authors and include;

- continuing the development of computer aided survey using the software package **Penmap** (Strata 1996), initiated during previous research projects in Lewis.
- to provide a linear survey control for the various area survey projects undertaken within the region.
- to examine the coastal strip of the island of Lewis where much of the visible evidence for both cultural heritage and palaeo-environment sites is best represented due to erosion and the detrimental environment of the interior which blanks much of the land surface.

## 2.2 *REPORT FORMAT*

This report is based upon the guidelines outlined by Historic Scotland's *Archaeological Procedure Paper 4* (1996, pp4-5). It consists of an introduction and summary of results (section 1), a review of the project background (section 2), a review of previous research (section 3) and a description of the methods employed during and after the survey (section 4). This descriptive information is followed by the results of the survey, fieldwork and desk based assessment (section 5).

Section 5 is split in to 38 sub-sections each represented by three maps (cultural heritage, erosion and geomorphology) with associated gazetteers. Each sub-section has brief descriptions of cultural heritage, erosion and geomorphology. Sites are referred to on the maps, in the text and in the gazetteers using either their national grid reference (6 or 8 figures) or, if one exists, by their NMRS archive number. Geomorphic and erosion cells are referred to by a unique sequential number

preceded by the Ordnance Survey national grid square letters (i.e. NA or NB). These sequential numbers start at the south-west at Aird Drollageo.

The results are followed by two sections that summarise and further analyse the data. The summary of results (section 6) draws together the salient points recognised in the gazetteers followed by the conclusions and recommendations (section 7). Finally the report includes a bibliography (section 8) and appendices that describe the hierarchy of the recording systems used.

### 2.3 *STUDY AREA*

The study area for this survey comprises the intertidal zone and a 50-200 metre strip inland from the Mean High Water Spring (where possible). The survey was executed along a linear transect running from Aird Drollageo (NA 994 203) in the south-west via the Butt of Lewis to Ranish (NB 402 255) in the south-east and represents a linear distance of approximately 450 kilometres. A wide diversity of coastal forms is included in this transect including high cliffs, areas of extended sand dunes and machair, intertidal saltings and isolated areas where alluvial deposition is prevalent.

Lewis is the largest land body in the arcuate chain of islands which makes up the Western Isles. The present landscape can be broadly separated into two main areas; the 'blacklands' and the 'whitelands'. The 'blacklands' cover most of the island interior and consist of a treeless subdued topography covered in blanket peat, dotted with hundreds of lochs of varying size and bare outcrops of Lewisian Gneiss.

The 'whitelands' consist of agriculturally more viable land on which most of the islands settlement is concentrated. Primarily coastal, its form is a function of the development of machair through natural processes (Ritchie 1966, 1979) and anthropomorphic intervention (Pankhurst and Mullin 1994, Boyd and Boyd 1990).

During the second half of the Holocene the increasingly marginal and forbidding interior has concentrated settlement within the coastal zone. The resulting archaeological remains cover all periods from possible Mesolithic artefact scatters, Neolithic ritual remains, through Bronze age landscapes in both machair and blanket peat, the monumental drystone architecture of later prehistory, Medieval *teampulls* and expanses of abandoned post-Medieval settlement. The concentration of this varied and diverse settlement within the coastal zone, coupled with the unique

preservation systems of peat and machair, have created an archaeological resource of great importance.

### 2.3.1 Coverage, extent and dimensions

The linear survey transect of 450 kilometres described in section 2.3 (see Figure 1) has been measured at a resolution of 1:25 000 (from Ordnance Survey Pathfinder series maps). The actual length of coastline covered depends on the resolution at which it is measured, the larger the scale the longer the distance recorded due to the greater maps detail. Therefore the distance walked is greater than that actually measured.

The coverage by linear transect included the intertidal zone (where it was deemed safe to examine it) and a 50-200 metre strip inland from the Mean High Water Spring. Extensions to the survey strip were made when areas subject to erosion processes directly related to the coastal erosion regime (*e.g.* Barvas machair; NB 346 514 were noted). No offshore islands were visited unless they were safe to reach by foot (*e.g.* Holm Island, NB 450 304) and some stretches of coast were inaccessible due to the presence of crofts (represented as green areas on the maps in section 5).

The linear survey transect is split into 38 map sections described in the table 2.3.2 and on Figure 1, with the map reference number generated using National Grid References from the south-west and north-east corners respectively.

### 2.3.2 Table of map sheet descriptions

<i>MAP SHEET</i>	<i>COVERING</i>	<i>PAGE</i>	<i>DESCRIPTION</i>
Map Sheet NA 97 20/ NB 00 25	Aird Drollageo to Mealista	44	The survey starts from the headlands of Aird Drollageo and Aird Griaminish and the secluded sandy beach of Sgeir Ghlas Griaminish. A section of sloping high cliffs is then followed until the lower lying beaches and machair of Totarol, Mealasta and Mol Forsgeo are reached.
Map Sheet NA 97 25/ NB 01 30	Mealista to Rubh' an Taroin	54	This section starts from the north of Mealista with incised cliffs giving way to a shingle beach at Camas a' Mhoil. A section of rock platform forming the intertidal zone then extends north round a headland until the shingle beach of Camas Islivig is reached. A section dominated by incised cliffs is then followed with the promontory of Rubh' an Taroin marking the end of the map sheet.
Map Sheet NB 00 30/	Neidelein to Fraoch Eilean	64	This section continues north with incised cliffs until the sandy beach and machair of Mangersta appears. The coastline then gives way to incised

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NB 02 35			cliffs for the rest of the section as it heads round the headland of Ard More Mangersta and into the straits leading to Uig Sands.
Map Sheet NB 02 31/ NB 06 35	Uig Sands	71	This section is centred on the bay and surrounding coastline of Uig sands and has been split into 4 map inserts at a scale of 1:12500 due to density of monuments and erosion units within the map sheet.
Extract 1	Carnish Machair	72	This section continues with less incised cliffs which give way to the beach and machair at Carnish. The headland forming the southern half of the entrance to Uig sands, Carnish Machair. Heading south down the west portion of Uig sands with the low machair edge and stream of Cappadale sands. At Skealasval the transect turns north again and starts following the edge of the large dune complex at the centre of Uig Sands.
Extract 2	Camas Uig	76	The edge of the large dune system is followed until the river of Lon Erista is reached and is followed upstream into areas of saltings and machair south of Totarol. The transect then continues along a low machair edge until further saltings and machair at Timsgarry are reached.
Extract 3	Traigh nan Sruban	80	This extract highlights further stretches of saltings and machair to the north of Uig sands centred on the saltings of Traigh nan Sruban.
Extract 4	Crowlista	83	The low machair edge to the west of Traigh nan Sruban is then followed round the headland at Crowlista before entering the shingle beach of Holm and Triasamol. A long stretch of cliffs is then followed west until the end of section as the transect heads north round the large headland of Aird Uig.
Map Sheet NB 02 35/ NB 06 40	Torcaso to Aird Uig	96	The cliffs are followed north for most of this section with occasional breaks for shingle beaches below the cliff line. The transect rounds Gallan head and heads south until the sandy beach of Aird Uig is reached.
Map Sheet NB 06 33/ NB 10 39	Aird Uig to Valtos	106	From the beach at Aird Uig a further section of high cliff is followed east until the sandy beach and machair of Traigh na Clibhe is reached. Further cliffs then unfold before reaching the sandy beach and machair of Valtos and Kneep. This map also includes a short section of low rock platform around Miavaig.
Map Sheet NB 10 30/ NB 14 37	Traigh na Berie to Aird Chaol	116	This section starts along the expanse of sand and machair of Traigh na Berie before rounding the headland of Stung and following the cliffs and low rock platform of the Bhaltos Peninsula to the short section of low rock platform in the previous map sheet. The transect is picked up again at Carishader and further low rock platform is followed east before reaching the shingle beach of Geshader. High cliffs then continue to the west of the mouth of Little Loch Roag (Map Sheet NB 11 24/ NB 14 30).

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			This map sheet <i>also</i> includes a stretch of the transect on the east of the mouth of Little Loch Roag, from Druim Mor to Aird Chaol, which is characterised by low rock platform interspersed with small shingle beaches and stretches of cliff.
Map Sheet NB 11 24/ NB 14 30	Little Loch Roag	128	Follows the west and east coast of the tidal loch of Little Loch Roag, which is dominated by low rock platform apart from the north-east stretch of high cliff and the shingle beach of Aonaig Bheag.
Map Sheet NB 14 31/ NB 20 35	Loch Barraglom	138	Runs on east from the transect on the east of the mouth of Little Loch Roag and consists of low rock platform and cliff for most of its length until it reaches Lundale shingle inlet. Half way along this section is Bernera Bridge which leads to Greater Bernera.
Map Sheet NB 13 33/ NB 19 37	Great Bernera (South)	147	The transect follows the coastline of Bernera from the bridge towards the west along cliffs before turning north along further cliffs before turning into the tidal inlet of Valasay. This map sheet <i>also</i> covers the south-west of Bernera, encompassing the townships of Kirkibost and Barraglom, which is dominated by cliffs and low rock platform.
Map Sheet NB 13 36/ NB 18 41	Great Bernera (North)	159	The transect continues up the west side of the tidal inlet up to Tobson and back down the east side to Valasay. A section of cliffs is then followed up the west coast of Bernera to the headland at Bostadh, interrupted only by a stretch of low rock platform around the west edge of the township of Tobson. Along the north cliff line of Bernera before heading south along further cliffs till the lower lying coastline of Aird Breacleite and Aird Mhor are covered.
Extract 5	Bostadh Beach	172	A detailed 1:12500 extract (Extract 5) is then provided for the Bostadh area due to the concentration of important archaeological monuments.
Map Sheet NB 20 29/ NB 24 34	Loch Barraglom to Calanais	176	This section concentrates on the coastline surrounding the inner reaches of the tidal East Loch Roag. The township of Linshader is passed before heading south down to the Grimersta lodge and estate. The transect turns north again following low rock platform past the fluvial outwash round Garynahine and up to the coastline delimiting the west edge of Aird Calanais.
Map Sheet NB 17 34/ NB 22 40	Calanais to Tolsta Chaolais	188	The north coast of Aird Calanais is followed until the low lying dissected peat and rock platform of Calanais is reached. Low rock platform then exists from Breasacleite to Tolsta Chaolais with the last stretch comprising of cliffs. The remainder of the section up to Geodh' a' Choin consists of cliffs, interrupted only by the tidal inlet at Crovag.
Map Sheet	Carloway to	197	This section continues north along cliffs past Carloway before turning



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NB 17 40/ NB 21 46	Garenin		into the inlet of Loch Carloway, surrounded by the townships of Kirivick, Knock Carloway and Borrowston. West from the Loch Carloway the transect heads north and then north-east along high cliffs interrupted only by the sand and shingle cove at Garenin.
Map Sheet NB 21 44/ NB 25 49	Dalmore to Garson Point	210	Opens with the sandy cove and machair of Dalmore and Dalbeg separated by a short stretch of high cliff. From Aird Dalbeg and Garson Point the rest of the section is taken up by incised high cliffs.
Map Sheet NB 25 46/ NB 30 50	Shawbost to Arnol	220	Starts at the large shingle cove of Loch Shawbost and continues with cliffs interrupted with a further shingle beach at Mol Fivig. The end of the cliffs marks the beginning of a series of shingle coves including Port Mhor Bragar and Port Arnol.
Map Sheet NB 30 49/ NB 35 53	Arnol to Barvas	229	This section starts with a stretch of shingle from Arnol, continues along incised cliffs before hitting the shingle and machair expanse of Barvas.
Map Sheet NB 35 52/ NB 40 57	Barvas to Shader	242	This section heads north-east from Barvas machair along low rock platform and shingle to Shader. Low cliffs of marine deposits and till are then followed to Borve.
Map Sheet NB 40 56/ NB 45 60	Borve to Galson	256	Continuing north-east along low cliffs of marine deposits and till from Borve, past Melbost Borve to Galson.
Map Sheet NB 44 60/ NB 50 64	South Dell, North Dell and Cross	266	Moving north with incised cliffs which last until the sandy cove of Dell Sands is reached. A stretch of sandy coves and machair interspersed by low cliffs and rock platform then begins.
Map Sheet NB 50 63/ NB 55 67	The Butt of Lewis	275	To the north is a stretch of sandy coves and machair interspersed by low cliffs and rock platform until Eoropie. A stretch of high cliff then starts from Eoropie, round the Butt of Lewis until terminating at Port of Ness on the east coast.
Map Sheet NB 54 60/ NB 58 66	Port of Ness to Port Alasdair	286	This section starts with cliffs until the sand and shingle bay of Skigersta is reached, with the remainder of the section devoted to high cliffs.
Map Sheet NB 54 54/ NB 57 60	Cellar Head	294	This entire of this section, centred on Cellar Head, is dominated by high sea cliffs
Map Sheet NB 53 48/ NB 57 54	Tolsta	302	The stretch of high cliffs continues south until the large expanses of sand and machair at Traigh Geiraha and Traigh Mhor are reached.
Map Sheet	Tolsta Head	312	Cliffs run round the headland of Tolsta Head and heading west until the

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NB 52 44/ NB 57 47			sandy cove of Port Beag is reached. The transect then heads south-west along further high cliffs.
Map Sheet NB 48 40/ NB 53 44	Glen Tolsta to Traigh Rebac	322	This section starts with further cliffs heading south until the sand and shingle beach of Sheilavig Mor is reached. Cliffs are then followed round the headland of Druim Mor until the transect again heads south along the expanses of sand and machair of Gress Sands and Traigh Rebac.
Map Sheet NB 45 36/ NB 50 40	Traigh Rebac to Broad Bay	332	This section starts with low cliffs and rock platform heading south before turning east towards the expanse of sand and machair of Dell sands. The sands are followed south until the remaining stretch of the section is reached, which comprises low rock platform at Aird Tong.
Map Sheet NB 44 31/ NB 48 36	Broad Bay	340	This section opens with the transect following the low edge of the sands and mud flats of Broad Bay, past Stornoway Aerodrome and crossing the narrow spit of land joining the Eye Peninsula to the main landbody of Lewis. This map sheet also includes the south edge of the spit before the with the low rock platform and shingle beach of Branahuie and Tolm.
Map Sheet NB 48 29/ NB 52 35	Eye Peninsula (West)	350	The transect on the Eye Peninsula starts from low cliff and rock platform at Aignish which graduates to cliff line by the end of the north transect at Garrabost. The southern section, coming from the east, consists of high cliffs for much of its length, with the final stretch comprised of shingle beach at Knock Ramadale and low rock platform before reaching the spit.
Map Sheet NB 52 29/ NB 57 35	Eye Peninsula (Centre)	358	This section starts with cliffs diminishing to low cliff and rock platform at Sheshader before graduating to high cliffs being followed in a south-westerly direction until low cliff and rock platform are again reached at Upper Bayble and Eagleton. The last stretch resumes the character of high cliff.
Map Sheet NB 52 35/ NB 58 39	Eye Peninsula (North-east)	366	This section starts with low cliffs and rock platform and heads north-east past Shulishader and Portnaguran before heading round the cliffs of Rubha Meadhonach and Tiumpán Head. The cliff line is then followed in a southerly direction past Portvoller and Aird.
Map Sheet NB 41 30/47 34	Stornoway Harbour	373	This section continues on from the southern section of Map Sheet NB 44 31/ NB 48 36, with further low rock platform and shingle beaches from Holm to Holm farm. The top of Stornoway Harbour is then entered by following low rock platform up to Lower Sandwick before the built up areas of Stornoway are reached. The transect heads south from Stornoway along the reinforced edge of Lewes Castle College which gives way to low cliff and rock platform as Arnish Point is approached.



Figure 1: Page location of map sheets

Map Sheet NB 39 25/ NB 44 30	Arnish to Ranish	386	The final section of the survey transect runs from Arnish to Ranish and begins with high cliffs extending southwards until the tidal Loch Grimshader is entered by turning west past Druim Dubh. The low rock platform at the front of Grimshader is then followed until low cliff and rock platform is followed south prior to arrival at Ranish.
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### 3.0 **PREVIOUS RESEARCH IN THIS STUDY AREA**

Previous research on Lewis has generally been carried out since 1989 and half is only recorded as unpublished interim reports. Prior to 1989 the main projects were the RCAHMS survey published in 1928, the work of the National Museum and Historic Scotland during the mid and late 1970s and the work of the Calanais Archaeological Project between 1985 and 1989. Except for the RCAHMS inventory a majority of this early work also remains to be fully published. Much of the work executed has been part of combined discipline studies of archaeology and the palaeo-environment. This has led to the creation of an extensive settlement record that is supported and placed firmly in context by, detailed environmental data.

Mesolithic occupation in Lewis is still a controversial issue that leads to disagreement amongst archaeologists working in the region. While physical anthropogenic evidence is scarce, a Mesolithic presence is implied through possible woodland clearances, and associated 'fire ecology', in pollen profiles such as those from at Tob nan Leobag and Bharabhat (Edwards *et al.* 1994, p16). However, this is not universal to all the cores taken suggesting that any evidence represents local activity. The only Mesolithic artefactual evidence recorded on Lewis are possible lithics in a midden now lost due to erosion at Traigh na Berie (Lacaille 1937). This lack of anthropogenic evidence can be partially explained by changes in sea level that have led to the loss of the Mesolithic coastal strip. Additionally the encroachment of peat across most of the islands interior following the Mesolithic during the Neolithic and Bronze ages (Edwards *et al.* 1994, p16) has obscured much of the prehistoric and later settlement evidence.

The activities of early farmers at the beginning of the Neolithic (around 5000 BP in Lewis) had a profound impact on the vegetation. Neolithic society is thought to have been complex and well organised due largely to the legacy of ritual remains such as the Calanais Stones and their associated ritual landscape. The settlement remains of the people who built these monuments are still poorly represented. This again is a function of rising sea level and peat encroachment but is also due to the