

Dissertation

Title "Cumbria: conflicting attitudes to radioactive waste disposal with regard to Higher Activity Waste (HAW) and Very Low Level Waste (VLLW)"

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“Cumbria: conflicting attitudes to radioactive waste disposal with regard to Higher Activity Waste (HAW) and Very Low Level Waste (VLLW)”

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Bsc (hons) Environmental Management

NT 3008: Undergraduate Dissertation

2013

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Abstract

It is apparent from this independent research project, and others' previous work, that the disposal of radioactive wastes within Cumbria, particularly Higher Activity Waste (HAW) and Very Low Level Waste (VLLW), is at the forefront of public concerns. This study has been conducted contextually, in that there are strong indications that a Geological Disposal Facility (GDF) is a possibility for the UK. However, by reviewing Cumbria's awareness and acceptability for permanent radioactive waste disposal sites, it is clear that this issue has not been effectively managed and communicated to the public through the Managing Radioactive Waste Safely (MRWS) process.

The two developments used to compare attitudes towards radioactive waste disposal were the Keekle Head VLLW disposal development and the potential GDF for HAW. With particular regard to these developments, attitudes, awareness and acceptability were studied through a questionnaire.

It became apparent during the study that public acceptance of nuclear waste disposal in Cumbria has improved post the MRWS process: but the Not in My Backyard (NIMBY) policy is still prevalent throughout the county, as expected. It was found that in relation to Very Low Level Waste (VLLW) disposal facilities there is a low level of support within West Cumbria, and a general lack of knowledge on the subject. Many were unaware of the differences in radioactivity levels and dangers between HAW and VLLW, with many categorising all nuclear waste into one category; therefore suggesting the region is ill educated in relation to the realistic dangers of radioactive wastes.

It was concluded that greater education is required within Cumbria as to the dangers of radioactive waste. This should be coupled with governing bodies and local authorities maintaining a high degree of transparency in relation to the 'nuclear agenda' to inform judgement on disposal options: this is essential for public acceptance.

Key Words: Geological Disposal, Higher Activity Waste, Very Low Level Waste, NIMBY, MRWS

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1. Introduction

1.1 Background to the research

Prior to 1976, little thought had been given to the question of how nuclear waste produced by military and civil nuclear energy programmes was to be dealt with. Some Low Level Waste (LLW) was disposed of at sea: however, most of the waste accumulated at various sites across the United Kingdom, including Sellafield in Cumbria (Royal Commission on Environmental Pollution, 1976). A report known as the Flowers Report, released in September 1976, raised concerns over the issue of radioactive waste management. It stated that:

“... it would be morally wrong to commit future generations to the consequences of fission power on a massive scale unless it has been demonstrated beyond reasonable doubt that at least one method exists for the safe isolation of these wastes for the indefinite future.”

(Royal Commission on Environmental Pollution, 1976)

1.2 Definitions of radioactive waste within the United Kingdom (UK)

Radioactive waste is a material that is above a certain level of radioactivity and has no further use (CoRWM, 2006). It is divided into four categories according to how much radioactivity it contains, and the heat that this radioactivity produces (CoRWM, 2006). Under the Radioactive Substances Act 1993, radioactive waste is strictly controlled through authorisations granted to operators so as not to harm people and the environment (IAEA, 2009).

Higher Activity Waste (HAW)	Waste in which the temperature may rise significantly as a result of its radioactivity and has radioactivity content above 12,000 Becquerels/gram (Bq/g).
Intermediate Level Waste (ILW)	Creates radioactivity above 12,000 Bq/g but does not significantly generate heat.
Low Level Waste (LLW)	Has a radioactive content that does not exceed 4,000 Bq/g of alpha or 12,000 Bq/g of beta/gamma radiation.
Very Low Level Waste (VLLW)	Is waste at the lower end of the LLW scale that is contaminated with a very small amount of activity (<4Bq/g).
Exempt Waste	Maximum 0.4 Bq/g

Table 1: Definitions of radioactive waste within the United Kingdom (NDA, 2012)

1.3 Organisations that produce radioactive waste in the UK

There are six major radioactive waste producers in the UK; these are identified within Table 2 below.

Nuclear Decommissioning Authority (NDA)	The public body responsible for the UK's public sector civil nuclear liabilities and their subsequent management (including Sellafield).
EDF Energy	Operates seven Advanced Gas-cooled Reactor (AGR) power stations and a Pressurised Water Reactor (PWR) power station.
GE Healthcare	A health science company that is a supplier of radioisotopes for medical, research and industrial uses.
Ministry of Defence (MoD)	Is a user of radioactive materials in its naval nuclear propulsion and atomic weapons programmes, and in other activities.
United Kingdom Atomic Energy Authority	Manages the UK fusion research programme and operates the Joint European Torus (JET).
Urenco	A uranium enrichment company.

Table 2: The six major radioactive waste producers within the United Kingdom (CoRWM, 2006)

Figure 1 (on page 3) shows the 35 sites of the major waste producers in the UK (CoRWM, 2012). In addition there are many 'small users' of radioactive materials such as hospitals and industrial, educational and research establishments producing small quantities of radioactive wastes; these organisations are not shown (CoRWM, 2012).

1.4 Definition of 'disposal' in the United Kingdom

In radioactive waste management, the term "disposal" is only used to define placing radioactive waste in an appropriate facility with no intention of retrieving it (IAEA, 2009). Plans for disposal facilities involve sealing the facilities when at full capacity, whereas storage facilities are kept open throughout their lifetimes, until the wastes or materials are removed (CoRWM, 2012).

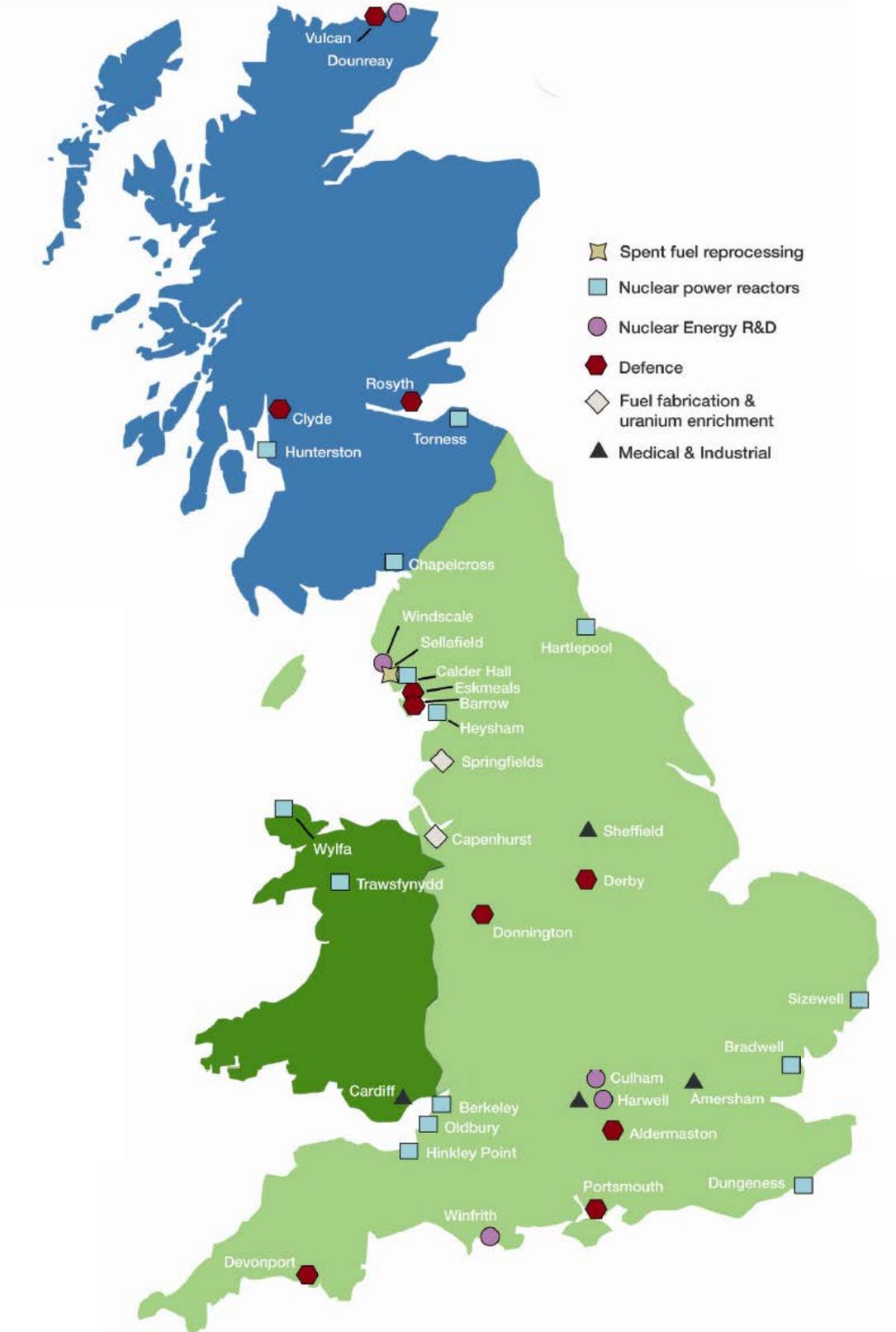


Figure 1: Radioactive Waste producers in the United Kingdom (NDA, 2010).

1.5 Higher Activity Wastes

The most long lived radioactive wastes, Higher Activity Wastes (HAW), must be contained and isolated from humans and the environment for very long periods of time (CoRWM, 2009). Disposal of these wastes in engineered facilities, or repositories, located deep underground in suitable geologic formations is being developed by many nuclear countries worldwide (IAEA, 2006), including the United Kingdom, as the preferred solution (CoRWM, 2006).

At 1 April 2010, the total volume of HAW stored at NDA sites was 86,300m³ with an additional 160,000m³ forecast in future arisings, indicated within Figure 2 below (NDA, 2010). Once all HAW is conditioned and packaged, the total volume is estimated to be 417,000m³, comprising approximately 217,000 waste packages (CoRWM, 2012). This lifetime packaged volume indicates how much HAW will need to be managed in interim stores, transported off site and disposed (CoRWM, 2012). Sellafield Ltd is the custodian of the majority of HAW in the NDA estate with it being forecast to produce 75.9% of the lifetime packaged volume, with most of this is generated at its Sellafield site (CoRWM, 2012).

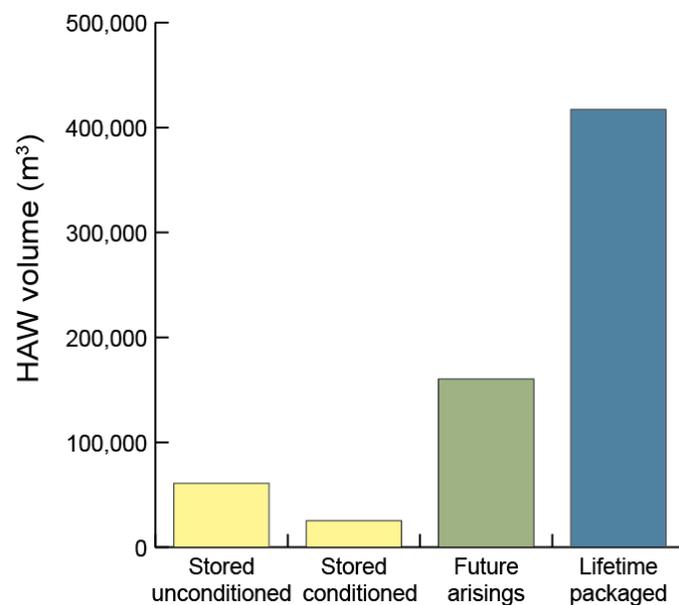


Figure 2: HAW volumes in the United Kingdom (CoRWM, 2012)

At NDA sites, HAW comes from past and continuing operations, and from subsequent decommissioning of facilities (CoRWM, 2012). The different activities at the sites mean that the radiological, chemical and physical forms of HAW are highly varied (CoRWM, 2012). Waste can range from large solid items to chemically reactive sludges and liquids (NDA, 2008). These different forms of HAW may need separate management arrangements that include conditioning and packaging solutions appropriate for their properties (NDA, 2008).

1.6 Very Low Level Waste

Very Low Level Waste (VLLW) is derived from a number of nuclear sites and non-related industries (LLWR, 2009). Table 3 below highlights the origins of VLLW production within the UK as identified by Low Level Waste Repository (LLWR). To provide a comparison of the relative radioactivity levels of VLLW: this classification of waste is within the 'normal' range of radioactivity in the soil, taking into account some areas are reasonably hazardous due to the natural presence of radon (HPA, 2012). The material proportions of VLLW arisings within the UK is located in table 4 below.

Site:	Volume (m ³):	Percentage of Total (%):
Sellafield	1,244,168	70
Research sites	83,793	5
Ministry of Defence	17,155	1
GE Healthcare	5,236	0
Dounreay	50,348	3
Springfields	378,981	21

Table 3: VLLW origins within the United Kingdom (LLWR *et al*, 2009)

Material:	Volume (m ³):	Percentage of Total (%):
Soil / rubble	1,155,249	63
Soft Organics	55,975	3
Plastic / rubber	83,273	5
Other	83,666	5
Oil	11	0.01
Metals	406,971	22.89
Graphite	1,606	0.09
Unknown Material	116	0.01
Wood	19,836	1

Table 4: Material proportions in raw VLLW within the United Kingdom (LLWR *et al*, 2009)

1.7 Aims of the research

This project aims to determine the issues that led to the proposed radioactive landfill development at Keekle Head (Cumbria) being rejected, with those associated with a proposed Geological Disposal Facility (GDF) in Cumbria. The difference between the projects will be established in terms of policy, public acceptance and awareness through a questionnaire.

A public questionnaire will seek to determine the public's awareness of the Keekle Head planning application and their perspectives as to whether approval should be sought in light of the Managing Radioactive Waste Safely (MRWS) process, with reasoning behind their choice. Data compiled by IPSOS Mori from the West Cumbria MRWS Partnership (WCMRWSP, 2012) process will be used to link the radioactive landfill site and a Geological Disposal Facility together, in order to draw conclusions and to statistically improve the research in terms of public perception.

1.8 Objectives

1. Develop and undertake questionnaires to assess the views and awareness of the public across several locations within Cumbria (Workington, Whitehaven, Carlisle, Penrith, Kendal and Barrow-in-Furness). This in turn will encompass all of the districts within Cumbria (Allerdale, Copeland, Carlisle, Eden, South Lakeland and Barrow-in-Furness) to establish patterns of awareness in relation to the issues associated with nuclear waste disposal.
2. Undertake research to establish the reasoning behind the rejection of a radioactive landfill site at Keekle head in Cumbria, given West Cumbria's nuclear vision through Britain's Energy Coast. This includes the attendance of future meetings of the Nuclear Issues Working Group, West Cumbria Sites Stakeholder Group and CIRIA.
3. Undertake research on the environmental impacts and need case for a geological disposal Facility in West Cumbria; to compare, and weight each proposals impacts and need against one another.
4. Analyse the results obtained from objectives 1, 2 and 3 to discuss the conflicting attitudes towards radioactive waste in Cumbria with regards to HAW and VLLW. Then apply this knowledge to the notion of how can a GDF for HAW be built when a VLLW landfill site was rejected considering the relative radioactivity levels?

1.9 Constraints of the research

There are a number of constraints associated with the research that is to be undertaken. The questionnaires can only be conducted on a weekend due to existing work commitments and finding willing participants.

The previously identified meetings within Objective 3 could become problematic to attend if the author's employment status were to change within the duration of this research.

Under the Data Protection Act 1990: the data collected from the questionnaires must only be used for the specific purposes for which it was collected and will not be disclosed to other parties without the consent of the individual whom it is about (HM Gov, 2012).

1.10 Solution to an awareness issue

The research on conflicting attitudes towards radioactive waste disposal with regard to HAW and VLLW is designed to be a partial solution to the issue of public awareness towards radioactive proposals in Cumbria. Current industry research has been undertaken by the Environment Agency (EA) and the Nuclear Decommissioning Authority (NDA) focussing on the feasibility and technicality of a GDF. Technical summaries have been published, and academically a GDF has been researched in general terms from international proposed facilities and public perceptions principles, with the lessons learned from the processes. However, there is the potential to 'bridge a gap' in linking previous disposal facilities that have been rejected within Cumbria (e.g. Keekle Head), and that of a proposed GDF, whilst seeking to answer the question 'how can a VLLW facility be rejected and a HAW facility built in the same county?'

2 Literature Review

2.1 The approach taken

The approach taken to review literature within the subject of radioactive waste disposal was to dissect the subject matter into sections: ranging from an initial broad (global level) perspective to a narrow (local level) perspective. This has then been supported by a public perception review to gain an understanding of previous studies within 'host communities' in relation to the disposal of radioactive wastes. The reason why this method has been undertaken is to gain a holistic understanding of the policies and of key governmental organisations.

2.2 The state of current knowledge - Higher Activity Wastes

2.2.1 International Atomic Energy Agency (IAEA) Policy

The diversity of radioactive waste to be managed, as well as the range of disposal facility designs and environmental settings available, has resulted in the development of several alternative disposal concepts (IAEA, 2009). Many concepts have been put into practice and radioactive waste disposal has been safely practiced since the middle of the 20th century (IAEA, 2009).

HAW (and spent nuclear fuel) must be disposed of in a deep geologic formation (IAEA, 2006). Intensive research performed in underground laboratories has demonstrated the viability of this approach for salt (Germany, USA), granite (Switzerland, Canada, Sweden, and Japan), plastic clay (Belgium) and mudstone (Switzerland, France) host formations (IAEA, 2009). The first repositories are anticipated to become operational in the early twenties (Finland, Sweden and France) (IAEA, 2009). Some other countries have initiated siting and investigation programmes (Germany, Switzerland, Czech Republic, Slovakia, Hungary, Russia) while others are planning for the geological disposal of high level waste and spent nuclear fuel (IAEA, 2006).

2.2.2 UK Government Policy

High level radioactive waste management concerns the storage and disposal of highly radioactive materials created during production of nuclear power and warheads (NDA and DECC, 2012). The technical issues in accomplishing this are daunting; due to the extremely long periods, in terms of a human lifetime, radioactive wastes remain damaging to living organisms and the short-term nature of legislation (NDA, 2010). Consequently, high level radioactive waste requires sophisticated treatment and management to successfully isolate it from the biosphere (NDA, 2012). This usually necessitates treatment, followed by a long term management strategy involving permanent storage, disposal or transformation of the waste into a non-toxic form (CoRWM, 2009). However, isolation of radioactive waste is not a long term solution: using a multi-barrier approach is only delaying or retarding the migration of radionuclides (NDA, 2012).

A central theme of UK radioactive waste management policy is the waste hierarchy (NDA, 2012). This is defined as the prevention of waste where practicable, minimisation where creation is unavoidable, re-use and recycling where there are opportunities to do so, and ultimately disposal for wastes that are not amenable for managing at higher levels in the waste hierarchy (NDA, 2012).

For HAW the long-term management policy of the UK Government is to package and hold wastes in secure interim storage until they can be transferred to a GDF, as illustrated within Appendix C (NDA, 2012). The UK Government is pursuing a voluntarism approach to siting a GDF with communities invited to express an interest in finding out more about what hosting a GDF would mean for their community in the long-term (WCMRWSP, 2012). This process of engagement is staged, and tailored to local circumstances (CoRWM, 2009) through the Managing Radioactive Waste process, stated within the MRWS white paper published in 2008 (DEFRA & BERR, 2008).

2.2.3 Committee on Radioactive Waste Management (CoRWM)

In 2003, the UK Government asked CoRWM to review the options for managing the UK's legacy Higher Activity Waste, and make recommendations on the option, or combination of options, that could provide a long-term solution, providing protection for people and the environment (CoRWM, 2009). For wastes that posed a long-term risk, CoRWM considered three options in much more detail: interim storage, geological disposal and phased geological disposal. CoRWM considered that geological disposal could be realistically achieved in the UK and possessed sufficient confidence in its long-term safety to be able to put it forward as the preferred option, while acknowledging that there are also contrary views (CoRWM, 2006). The UK Government stated that it wanted CoRWM to review all the options that had been given serious consideration by the international scientific community (IAEA, 2006). These included the disposal of radioactive waste in the: sea, ice caps, and the possibility that it could be permanently stored above the ground (CoRWM, 2006). This "long list" was assessed using criteria designed to identify which options should be appraised further. Most of the options were "screened out" because they were unlawful, unethical or posed an unacceptable risk to people's safety or to the environment (CoRWM, 2006).

2.2.4 Cumbria County Council (CCC), Allerdale Borough Council (ABC) and Copeland Borough Council (CBC) perspectives

The three local authorities that expressed an interest in hosting a GDF in 2008 participated in the West Cumbria MRWS Partnership during Stage 3 of the MRWS process (CCC, 2012). The Partnership itself did not take any decisions; only whether or not to continue to support the MRWS process in Cumbria (NAO, 2012). Community events took place whereby more than 800 people attended, which is a poor attendance given the population of Cumbria is 499,900 (CCC, 2012), to speak to Partnership members and experts from the Nuclear Decommissioning Authority, the Department for Energy and Climate Change, the regulators (the Environment Agency and the Office for Nuclear Regulation) and independent geologists (CCC, 2012). They also took part in discussion sessions where various issues related to the area potentially taking part in the Government's search were considered. An opinion poll conducted by Ipsos MORI, beginning on the 8 March, was conducted with 3,000 people being surveyed over the telephone (WCMRWSP, 2012). Currently, all three council's policy is to support the deep geological disposal of radioactive wastes in the United Kingdom, regardless of the decision to vote against progressing with the MRWS process in January 2013 (CCC, 2013).

2.2.5 MRWS Partnership – IPSOS Mori survey

The results of the representative opinion poll to establish if West Cumbria was in favour of taking part in the Government’s search for a suitable site for a GDF was published on the 22 May 2012 (CCC, 2012). The results from this final survey of opinion of West Cumbria households were one of three key MRWS Partnership indicators for considering continued engagement (WCMRWSP, 2012).

Number:	Key Indicator:
1	Broad support for the Partnership’s preliminary judgments from its member organisations and the public via consultation (the quality of responses, not the weight of responses, is important here).
2	Evidence that issues raised have been fairly considered.
3	That the percentage of the surveyed public in Copeland and/or Allerdale that support without commitment participation in the process for identifying a potential candidate site is greater than the percentage that oppose it (ie that there is ‘net support’ in West Cumbria for moving to a candidate GDF site identification process).

Table 5: Key indicators within the West Cumbria MRWS Partnership (WCMRWSP, 2012)

The results of the first three opinion polls surveyed by IPSOS/MORI in Cumbria showed overall net support, see table 6 below (CCC, 2012).

	In favour:	No opinion or Don’t know:	Oppose:	Net Support:
Survey 1: All of Cumbria	50%	25%	25%	25%
Survey 2: All of Cumbria	43%	27%	30%	13%
Survey 3: All of Cumbria	48%	25%	28%	20%
Survey 3: Allerdale	52%	23%	25%	27%
Survey 3: Copeland	62%	20%	19%	43%
Survey 3: Rest of Cumbria	44%	26%	30%	14%

Table 6: IPSOS Mori MRWS results of surveys 1 to 3 (WCMRWSP, 2012)

The results of a fourth and final statistically significant survey by IPSOS/MORI of 3000 households across Cumbria showed overall net support (table 7) remains strong, though weakened in Allerdale (CCC, 2012).

	In favour:	No opinion or Don't Know:	Oppose:	Net Support:
All of Cumbria	53%	14%	33%	20%
Allerdale	51%	12%	37%	14%
Copeland	68%	9%	22%	45%
Rest of Cumbria	50%	15%	35%	16%

Table 7: IPSOS Mori MRWS results of survey 4 (WCMRWSP, 2012)

The poll is important to the MRWS process as it will help to gauge whether there is sufficient support in Allerdale and Copeland to take part in the search for a GDF, albeit without any commitment to ultimately hosting a facility (ABC, 2013) and (CBC, 2013).

If a decision was taken to participate with MRWS stage 4, there would be extensive testing of geology, which could take approximately 15 years to find a potentially suitable site (WCMRWSP, 2012). Local people would also continue to be involved and the Councils would have the right to withdraw whilst this work is taking place (CCC, 2012).

2.2.6 MRWS decision Cumbria

The MRWS decision to be taken by Allerdale Borough, Copeland Borough and Cumbria County Councils Cabinets was initially delayed from 11 October 2012 until 30 January 2013 (CCC, 2012). The reasons cited for the delay are (Martin *et al*, 2012):

1. First of all, there is the need to strengthen the right of withdrawal, to make it legally binding. Cumbria County Council, Copeland Borough Council and Allerdale Borough Council welcome DECC's commitment to looking at putting this on a firmer footing by the end of Stage 4, but would also like a better understanding of the detail and timescale behind such a commitment.
2. Secondly, whilst welcoming DECC's commitment to using the Partnership's 13 principles as a basis for negotiation on community benefits in Stage 4, further discussions to clarify the process of such a negotiation are required.
3. The third issue is that the suitability of the geology was of paramount concern to many residents of Cumbria due to the lack of definitive information presently available. But, as the process to secure this information will take a substantial period of time, they felt that alternative radioactive waste management solutions should be considered in parallel with the MRWS programme, in case that process ultimately fails to secure a positive outcome.

On the 30 January 2013: Allerdale Borough, Copeland Borough and Cumbria County Council's Cabinets voted on whether or not to proceed to stage 4 of the MRWS process (NDA, 2010). The table below shows the options available to the local authorities, with regard to the decision, available for discussion.

Option Available:	Description:
1	Decide to participate in stage 4 in respect of both Allerdale and Copeland
2	Decide to participate in Copeland, but not Allerdale
3	Decide to participate in Allerdale, but not Copeland
4	Decide not to participate

Table 8: Cumbria County Council MRWS stage 4 options (Cumbria County Council, 2013)

Option Available:	Description:
1	Decide not to participate in stage 4 including credible reasons for not doing so
2	Decide to defer a decision including credible reasons for doing so and what needs to be done to enable a decision to be made
3	Decide to participate in stage 4 for Copeland

Table 9: Copeland Borough Council MRWS stage 4 options (Copeland Borough Council, 2013)

Option Available:	Description:
1	A decision not to participate including reasons for doing so
2	A decision to defer, including reasons for doing so and what needs to be done to enable a decision to be made
3	A decision to participate with conditions, including the reasons for doing so
4	A decision to participate without conditions including the reasons for doing so

Table 10: Allerdale Borough Council MRWS stage 4 options (Allerdale Borough Council, 2013)

The options available to each of the three councils were considered and the voting resulted in Cumbria County Council rejecting a move to Stage 4 of the MRWS process (CCC, 2013). In contrast, Allerdale and Copeland Borough Councils voted 'yes' to move to the next stage (CBC, 2013 & ABC, 2013). The precise details of the voting are detailed in the table below.

Local authority:	Yes:	No:
Cumbria County Council	3	7
Allerdale	5	2
Copeland	6	1

Table 11: Local authority voting for MRWS stage 4 (CCC, 2013)

As a result of the vote, a Geological Disposal Facility cannot be built within Cumbria under the current MRWS process (DECC, 2013). Cumbria County Council had the right of 'veto' against the process, and thus regardless of the 'yes' vote by Allerdale and Copeland, the process cannot continue (DECC, 2013).

2.2.7 Geological Perspectives of siting a GDF in Cumbria

West Cumbria is an area in which the landscape and the working lives of local people are dominated by the underlying geology (BGS, 1997). The assertion by CoRWM that there is presently no credible scientific case to support the contention that all of West Cumbria is geologically unsuitable is reviewed and refuted (BGS, 1997). David Smythe in 2011, (Professor of Geophysics at the University of Glasgow), stated that national and international criteria for choosing a suitable waste repository are in agreement that the geology should be simple and predictable. The coastal strip of West Cumbria is well understood, but highly complex, and thus is in conflict with national and international recommendations (Haszeldine, 2012).

NIREX proposed to host a rock characterisation facility in 1995 at Longland's Farm adjacent to Sellafield; but this proposal was rejected on the fundamental science underpinning NIREX's site of choice (NIREX, 1997). Northern Cumbria, between the National Park and the Solway, is geologically even more complex (BGS, 2010). The whole northern region under consideration has been the subject of hydrocarbon exploration for 40 years; applying logically the exclusion criteria defined by the British Geological Society means that it should have been screened out (Smythe, 2007).

Professor S.R. Haszeldine (University of Edinburgh) agrees with Professor Smythe's consensus and states that there is an abundant suite of existing scientific work, which has not been presented through the MRWS process that clearly provides evidence equivalent to the desk studies and subsurface investigations of MRWS stages 4 and 5 (Haszeldine, 2012). This shows that West Cumbria has adverse geological conditions to host a GDF.

Examination of this evidence and the potential to acquire new expensive and detailed evidence from west Cumbria will (Haszeldine, 2012):

1. End up in a rejection of the region as a siting location – just as it was rejected in 1997 after the evidence was examined
2. Waste money and time
3. Risk councils being over-ruled by central government to enforce the siting of a GDF, once any sort of detailed investigation begins.

However, to contradict the points made above, the Geological Society of London (GS) agrees that the sensible solution to dispose of Higher Activity Wastes in the UK is for Geological Disposal. The GS responded to the CoRWM Report to Government on Deep Geological Disposal of Higher Activity Wastes that it was:

".....a very good report, pulling together a lot of useful information about geological disposal in the MRWS process. In particular, it does a service to NDA Radioactive Waste Management Directorate in communicating effectively their approach and the activities planned for the coming years. The recommendations are appropriate and sensible, and the technical detail provided should command widespread support in the Earth science community."

(Geological Society of London, 2009)

2.2.8 Other communities which considered participating

On the 17 May 2012, Shepway District Council expressed an interest in volunteering to host a potential Geological Disposal Facility (GDF) in response to the Department of Energy and Climate Change (DECC) MRWS White Paper (NuClear News, 2012). As a result of the 'expression of interest', Shepway District Council sent letters to local residents asking if they would be willing to host a GDF and nuclear research facilities (NuClear News, 2012). The local community must be persuaded before a formal expression of interest can be put forward in September 2012 (NuClear News, 2012). However, Kent County Council are against the 'expression of interest' and vowed to utilise 'every tool in the box' to fight the development (NuClear News, 2012).

Consultation on plans to build a nuclear waste processing plant on the Romney Marsh resulted in 63% of residents, and 50% of businesses rejecting the proposal (BBC, 2012). Further to this, Shepway District Council's Full Council meeting on the 19 September 2012 proposed not to submit an 'expression of interest': this was accepted by a proportion of members (21 – 13), with 4 abstentions from voting (SDC, 2012). The decision ultimately fell upon the Leader of Shepway District Council (Cllr. Robert Bliss) who agreed with the views taken by his colleagues not to submit an 'expression of interest' into a nuclear research and disposal facility on Romney Marsh (SDC, 2012).

2.3 The state of current knowledge – Very Low Level Wastes

2.3.1 International Atomic Energy Agency policy on VLLW disposal and management

Radioactive waste disposal aims at emplacing waste in a facility which ensures long-term safety through a system of multiple natural and artificial barriers working together to prevent radioactivity from escaping (IAEA, 2009). A number of alternative disposal options have been developed for managing radioactive waste (IAEA, 2009). The options reflect the specifics of national legislation, geological differences and variations in the amount and characteristics of different waste types (IAEA, 2009). The policy they hold with regard to very short lived waste is that it can be stored for decay, and then cleared for disposal as non-radioactive waste (IAEA, 2009). However, Very Low Level Waste can be directed into surface trenches utilising a limited engineered barrier system (IAEA, 2009). Such facilities have been built in Sweden (at each nuclear power plant), France and Spain (IAEA, 2009).

2.3.2 The UK Government policy on VLLW disposal and management

Previously within the Radioactive Waste Management White Paper in 1995: the UK Government first discussed the notion of disposing of VLLW in a landfill site but concluded:

“...not to encourage greater use of controlled burial by the nuclear industry”

(EA, 2011)

This was then superseded in March 2007 by a new Government White Paper on Low Level Waste policy which stated it:

“...sees no reason to preclude controlled burial of radioactive waste from nuclear sites from the list of options to be considered in any options’ assessment”

(DEFRA, 2007)

The corporate sector has already started looking for opportunities presented by this new policy: waste management companies, Sita Group and Energy Solutions, are attempting to continue with plans to use landfill facilities in Cumbria, at Keekle Head and Lillyhall, for managing waste from Sellafield, and elsewhere (Energy Solutions and CCC, 2012).

2.3.3 Endecom UK Ltd – Keekle Head VLLW proposed development

Endecom UK Ltd was set up by SITA UK to manage the disposal of Low Level Waste and Very Low level Waste arising from nuclear establishments, primarily the decommissioning at Sellafield (SITA UK, 2009). Endecom has secured an option agreement, subject to planning approval being granted, on the purchase of a 70 hectare former opencast mine at Keekle Head, five miles north-east from Whitehaven (SITA UK, 2009). The company has examined the potential to use the derelict site for the disposal of low and very low level radioactive waste construction and demolition waste, and submitted a planning application to Cumbria County Council in December 2009, an illustration of the development is located within Appendix B (SITA UK, 2009). The former quarry has been derelict since mining ceased in 2006, leaving behind a substantial area of despoiled land and an excavation void, which requires backfilling (SITA UK, 2009).

On the 8 May 2012, Cumbria County Council, through the Development Control and Regulation Committee, refused the planning application at Keekle Head. The reasons stated for the refusal of planning permission were (CCC, 2012):

- There is no need for such a facility until at least around 2030.
- Alternative sites, including those on or next to existing nuclear sites where the waste arises, have not been fully assessed.
- The development is against waste planning guidance on all communities taking responsibility for their own waste and would lead to unnecessary road transport miles as Keekle Head is not accessible by rail or sea. *(Yet, CCC found it acceptable to transport and dispose of VLLW to a landfill site at Lillyhall (Workington) by the same means).*
- The development would have an unacceptable impact upon a UK Priority Habitat and a County Wildlife Site and no adequate mitigation or compensation measures had been considered: even though the site is currently derelict.
- The development would have an adverse impact visually on local residents and on the surrounding landscape. *(This is considering Sellafield is of close proximity and is far more visually intrusive. The end state of the site is a landscaped area, which visually, is far more acceptable than an open cast mine as the site currently stands).*

However, on the 8 November 2012, Endecom UK Ltd chose to appeal to Cumbria County Council to reverse the decision to initially reject the proposal at Keekle Head (Endecom UK Ltd, 2012). With a public hearing in June 2013 to resolve the matter as to whether the development continues (Endecom UK Ltd, 2012). The reasoning for the appeal is that (Endecom UK Ltd, 2012):

- There is a need for such a facility as VLLW capacity at Sellafield's Calder Hall Landfill Extension Segregated Area (CLESA), and Lillyhall Landfill site near Workington have a limited remaining life / capacity, and are 'significantly more limited in the radioactivity levels they can accept for disposal than the Keekle Head proposal'. Taking the VLLW arising predicted in the period to 2029 within the Radioactive Waste Inventory (NDA & DECC, 2011), they contend that these two proximate existing facilities do not have sufficient capacity to manage the predicted arisings in the period 'until around 2030'.

2.4 The state of current knowledge - public perception studies

Public opposition to the disposal of radioactive waste in the United Kingdom has often been characterised as being largely of the "not in my backyard" (NIMBY) policy (Clary et al, 1991). It is argued that much of the public distrust plans for radioactive waste disposal: these views are heavily influenced by a history of radiological releases from nuclear sites, e.g. Chernobyl, Fukushima and Windscale, now Sellafield (Burns *et al*, 1992).

Reviewed in particular is the recent public discussion on the deep disposal of radioactive wastes. Rather than being simply NIMBY responses, many of the public views expressed reflect a hierarchy of concerns about environmental risks: local economic impact, health and the environment, and distrust of the nuclear industry (Dunlap, 1993). It is argued that the NIMBY concept may be applied too readily, a convenient attribution of motive which disguises a more fundamental range of technical, environmental, and socio-economic concerns (Desvougues et al, 1988).

Many people remain unconvinced that living next to a nuclear power station or a deep repository for nuclear waste (especially for HAW) is safe (West, 2011). Anything 'nuclear' is seen as dangerous, polluting and unpredictable (Chapman, 1986). Much of this anxiety is the result of decades of concerns about nuclear weapons, radioactive fallout from atmospheric bomb testing and the long-term effects of exposure to radiation (Chapman, 1986). Such worries are confirmed and reinforced by 'incidents' at Windscale (1957), Three Mile Island (1979), Chernobyl (1986) and Fukushima (2011) (West, 2011). Compounding the problem of confidence in the nuclear industry is secrecy or at least the failure to openly provide relevant and sufficient information, which has often resulted in a feeling that 'the nuclear industry' is not telling the whole truth (West, 2011).

Building confidence in the nuclear industry is a crucial, extremely difficult task that must be undertaken if the disposal of radioactive wastes in a GDF is to be achieved (West, 2011). Lessons can be learned from the communication experiences in other countries, particularly with regard to geological disposal (McKinley and West, 2007). The disposal of nuclear waste is one of the most controversial issues faced by the authorities, an example of which is Japan (Van der Horst, 2007). Even prior to the Tohoku earthquake in 2011, there was already a strong concern about the potential leakage of radionuclides, with most respondents of a survey by (Van der Horst) believing the government would take proper steps to protect civilians, but overall, trust in authorities was modest. The NIMBY phenomenon was relevant, as acceptance decreased drastically if the facility was located near the respondents' residential place (Van der Horst, 2007).

2.4.1 Impact of a nuclear waste repository facility on perceptions of West Cumbria

In 2010, the West Cumbria Managing Radioactive Waste Safely Partnership commissioned GVA Ltd to undertake qualitative research to understand the potential impact on perceptions of West Cumbria and other parts of the country, should plans for a GDF progress (GVA, 2011). The aims of the research were to understand the perspectives of current and prospective residents, visitors, businesses and potential investors of any developments of this nature (GVA, 2011). The results of this study were:

1	Current perception of quality of life is strong at present with around 75% of the sampled population believing West Cumbria is a 'good' or 'excellent' place to live.
2	Around half of those interviewed believed that the GDF would have no impact on this, the other half split almost equally between those thinking it would enhance quality of life and those believing it would get worse.
3	There was significant spatial variation between different parts of the area, with those living further north and east (e.g. in Wigton and Keswick) holding more negative views than those living in, for example, Egremont or Workington.
4	Perceived impact on both the availability and quality of jobs was positive with 80% believing there would be more jobs, and 70% thinking these would be superior to those currently available.
5	6 in 10 thinking that more new investment would flow into the area.
6	Whilst over half of residents perceived no impact on the environment, 40% have some concerns around noise, ecology and the landscape.
7	Around 70% of those interviewed could see no health issues.
8	36% of visitors feel that Cumbria would be negatively impacted by a GDF, whilst 42% feel that West Cumbria would be a worse place to visit.
9	The environmental impact was a concern. 60% of those interviewed believed that there would be an adverse impact on noise, ecology and landscape.
10	4 in 10 visitors felt that the GDF would impact on the number of tourists, with 36% believing that there would be reduced tourism spend within the county. A third of all those surveyed felt that there would be an impact on the 'cultural heritage' of the area.
11	Also acknowledged, however, was that the GDF will attract a lot of negative publicity which will need to be managed. Investors would not be attracted to the 'nuclear coast'.
12	The GDF is seen perceived to be generally positive amongst the business community, with potential to boost the economy, strengthen supply chains and attract investment.

Table 12: Impact of nuclear waste facilities in West Cumbria (adapted from (GVA, 2011))

2.5 Opposition group perceptions of radioactive wastes

As Greenpeace noted in its submission on the first round of public consultation on MRWS; ultimate disposal is not a foregone conclusion, and so because of this, 'interim' storage could become indefinite by default (Greenpeace, 2008). Greenpeace state that hundreds of millions of pounds could be 'poured' into proving a geological disposal concept with no guarantee of construction (Greenpeace, 2007/2004). Friends of the Earth concluded that the MRWS public consultation, like the 'in principle' nuclear consultation that preceded it, is more an exercise of going through legal consultation procedures, as distinct from a process of truly trying to engage, fairly inform, understand and respond to public opinion and knowledge (FoE, 2007). They believe that this is borne out of a desire to rush through a new nuclear programme because various influential interest groups want new nuclear power stations (FoE, 2007).

The creation of radioactive waste should be minimised: first and foremost this involves the need to stop producing nuclear waste with nuclear power stations phased out as quickly as possible, and reprocessing which magnifies the waste problem, should end (NFLA, 2010). Radioactive waste in existing waste should be immobilised in a stable and physical form utilising the Best Available Technique (BAT), so that the need for maintenance and human intervention is minimised (NFLA, 2010). Waste stores should be monitored and waste should be capable of being retrieved from storage for further remedial action or repackaging if necessary (NFLA, 2010). There is also the argument from anti nuclear groups in many countries that 'solving' the waste disposal problem only encourages the nuclear industry to continue its dangerous activities; indeed many opposition groups now use this link to block any new nuclear power stations until the waste problem is resolved.

The formation of, 'No Ennerdale Nuclear Dump' (NOEND) and 'Silloth Plain Against Nuclear Dump' (SPAND), have been created in response to the ongoing MRWS process in Cumbria (NuClearNews, 2012). NOEND has been set up by residents of the Ennerdale Valley who are concerned that they are one of the communities that have been volunteered, without their consent, to host an underground facility for the storage of nuclear waste (NOEND, 2012) and (Clark, 2012). SPAND is a group of residents in Silloth and the surrounding area, who are extremely concerned about Allerdale Borough Council and Cumbria County Council volunteering interest in this area being used as a proposed underground repository for high level nuclear waste (SPAND, 2012).

3 Methodology

The methods and techniques that were used to gather, analyse and present the collected data are: questionnaires to be completed by the public, meeting attendance and case study, desk-based research.

The timescale for the research is from May 2012 until April 2013. A detailed Gantt chart is located within Appendix A which illustrates the timescales of the data gathering, analysis of the data and presenting these findings in a dissertation format.

The research will be undertaken in conjunction with Cumbria County Council and will utilise their contacts and resources. Permission to attend relevant meetings will be sought through contacts already established through working at Cumbria County Council as a Nuclear Issues Officer.

3.1 Hypotheses to be investigated

Hypotheses:	Null:	Alternative:
1	The proximity to the Keekle Head development and awareness of the project are independent.	The proximity to the Keekle Head development and awareness of the project are not independent.
2	The proximity to nuclear sites in Cumbria and awareness of the differing levels of radioactivity are independent from one another.	The proximity to nuclear sites in Cumbria and awareness of the differing levels of radioactivity are not independent from one another.
3	The proximity to the Keekle Head nuclear development and acceptance of the development are independent.	The proximity to the Keekle Head nuclear development and acceptance of the development are not independent.
4	The proximity to nuclear developments and the rejection reason due to NIMBY are independent.	The proximity to nuclear developments and the rejection reason due to NIMBY are not independent.
5	The proximity to proposed nuclear developments and the awareness of the rejection of the Keekle Head developments are independent.	The proximity to proposed nuclear developments and the awareness of the rejection of the Keekle Head developments are not independent.

Table 13: Hypotheses to be investigated

3.2 Relevant Methods of investigation

3.2.1 Questionnaires

Questionnaires will be carried out in locations across Cumbria to identify a cross section of public perceptions. The locations of the surveys are Carlisle, Penrith, Kendal, Workington, Whitehaven and Barrow-in-Furness (the locations in a map format are located within Appendix D). The questionnaires were carried out on weekends, once for each location due to existing work commitments: but will provide the greatest opportunity to question people from varying backgrounds as people will be away from work for the weekend. The locations of the questionnaires are the ‘administrative hubs’ of the districts from which they are in: therefore the results obtained will be broadened to cover the entire district.

Survey Location:	Administrative District:
Carlisle	Carlisle
Penrith	Eden
Kendal	South Lakeland
Barrow-in-Furness	Barrow-in-Furness
Workington	Allerdale
Whitehaven	Copeland

Table 14: Survey locations and administrative districts within Cumbria

This is to increase the validity and robustness of the results obtained as potentially a greater number of participants from a wide range of backgrounds and education levels can be sampled (Savenye and Robinson, 1996). The questionnaire was designed to ‘mirror’ the survey undertaken by IPSOS Mori, in relation to the MRWS process, so that clear and concise comparisons can be made between the schemes: the IPSOS Mori survey is located within Appendix E. Chi-square test for independence will be used to statistically analyse the data against the hypotheses: if the p-value created as a result of the test is less than 0.05 then the ‘hypothesis’ is to be accepted.

Analysis Type:	Software Used:	Licensed by:
Statistics	Minitab	University of Central Lancashire
GIS	ESRI ArcGIS 9.2	Cumbria County Council

Table 15: Software used to analyse the data generated from the questionnaire

The questionnaire method of investigation is relevant for this study due to the ability to directly question the people who will be affected by the proposed radioactive waste disposal developments directly (Woods, 2006). Other forms of investigation achieve this aim also such as interviews; however, the informal nature of this type of investigation will transcend to greater participation within this study (Woods, 2006).

Under the Data Protection Act 1998: the data collected from the questionnaires will only be used for the specific purposes for which it was collected and will not be disclosed to other parties without the consent of the individual whom it is about (HM Gov, 2012). To avoid contravening this aspect of the Data Protection Act, the names of the people undertaking the questionnaires will not be recorded (HM Gov, 2012).

3.2.2 Meeting Attendance

The meetings of the West Cumbria Sites Stakeholders Group (WCSSG), Managing Radioactive Waste (MRWS) Partnership, the Nuclear Issues Working Group in Cumbria and the CIRIA event on Very Low Level Wastes have been identified as meetings that can be attended as an 'observer' in order to better understand the nuclear agenda in Cumbria. These meetings / events will be attended in order to gain further understanding of the subject from an industry perspective and to add validity to understanding of the subject matters involved within the research.

3.2.3 Case Studies

Case studies will also be a primary research method to provide multiple angles from which to address the research question. Case study research can be undertaken from the online resources provided by the NDA, DECC, MRWS and the UK Government.

3.2.4 Qualitative Research Method

Qualitative research is used to gain an in-depth insight into matters that affect human behaviour: It is a study that reflects more on the why and how of decision making, by studying people's attitude, behaviour, concern etc (Savenye and Robinson, 1996). Qualitative research is multi-focal in its reasoning, exploring, questioning and answering; hence, it is extremely useful in enhancing communication and facilitating research (Savenye and Robinson, 1996). Unlike quantitative data collection, methods of qualitative research are based on unstructured interviews and recordings, and feedback: thus reasonable for the aims of this study (Savenye and Robinson, 1996).

3.3 Anticipated Results

The anticipated results from the questionnaires will be that:

- Greater awareness of nuclear developments will be in West Cumbria (Workington and Whitehaven)
- West Cumbria will have greater knowledge of radioactivity levels in comparison to other districts in Cumbria.
- Acceptance of the Keekle Head development will decrease the closer to the development the district is. Therefore Allerdale and Copeland will be expected to have low acceptance and higher elsewhere.
- The main reason for rejection of the Keekle Head development will be primarily based upon the NIMBY policy within West Cumbria due to the close proximity to the development.
- Greater awareness of the rejection of the Keekle Head development will be prevalent in Copeland and Allerdale but not in other districts within Cumbria.

3.4 Questionnaire example

Cumbria: conflicting attitudes to radioactive waste disposal with regard to Higher Activity Waste (HAW) and Very Low Level Waste (VLLW)

Location: Carlisle city centre (The Lanes Shopping Centre)

Good morning/afternoon/evening. My name is Peter Allan from the University of Central Lancashire (UCLan). I am carrying out an important piece of research on behalf of UCLan and Cumbria County Council. The research is about issues around possible future developments in the area.

The aim of the research is to determine public awareness of the Keekle Head and Managing Radioactive Waste Safely (MRWS) projects in relation to perspectives as to whether they should go ahead with reasoning behind your view.

The research follows the Market Research Society Code of Conduct and all your responses will be treated in the strictest confidence. The questionnaire lasts around 10 minutes.

1. Do you live in Cumbria?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

2. In which District Council area do you live?

Allerdale	<input type="checkbox"/>
Barrow-in-Furness	<input type="checkbox"/>
Carlisle	<input type="checkbox"/>
Copeland	<input type="checkbox"/>
Eden	<input type="checkbox"/>
South Lakeland	<input type="checkbox"/>
Elsewhere	<input type="checkbox"/>

A few examples of Very Low Level Waste produced from the nuclear industry are: concrete, steel, glass, stone, pipes and pumps. This waste has the same radioactivity as the 'normal' level of the Earth's crust excluding areas where Radon is present, therefore is considered to be safe for disposing of in a landfill site with protective measures.

3. Are you aware of the planning application for a VLLW landfill disposal site at Keekle Head?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

4. If yes, how much do you feel you know about the planning application at Keekle Head?

I know a lot about it	
I know a fair amount about it	
I know just a little about it	
I have heard of this but know almost nothing about it	
I have never heard of it	

5. Are you aware of the differences in radioactivity levels between HLW and VLLW? Or would you classify all radioactive waste under one category?

Yes	
No	
One Category	

The differences in radioactivity between VLLW and HAW are determined in the amount of radiation given off from the waste and time it takes for the waste to decay. Higher Activity Wastes are at the highest end of the scale and give off the most radiation and take the longest to decay whilst giving off the most heat. Very Low Level Waste on the other hand: this waste is at the lowest end of the scale that is classed as radioactive and thus gives off the least radiation and generates no heat whilst decaying.

6. Do you believe a VLLW disposal site at Keekle Head should be built?

Yes	
No	

7. If yes / no, the reasons behind your choice? (multiple selections allowed)

Yes	
Bring jobs to West Cumbria	
Bring economic investment to West Cumbria	
May provide infrastructure improvements through community benefits packages	
Increase the sustainability of the nuclear industry within West Cumbria	
Can help to create a 'world class environment' for nuclear development in West Cumbria	
No	
Absence of information relating to the project	
Lack of trust in the decision making bodies	
Poor prospect of finding suitable geology	
Do not want nuclear waste disposed in my back yard	
Health impacts related to radioactive waste	

8. Are you aware of the reasoning behind the rejection by Cumbria County Council of the Keekle Head project?

Yes	
No	

The reason why Cumbria County Council rejected the Keekle Head planning application was because of the lack of need for such a facility as underlined by Low Level Waste Repository Ltd.

Thank you for taking the time to complete this survey.

4 Results of Investigation

4.1 Questionnaire Results

The completed questionnaires for this study are located within Appendix F, and the results below are summaries of the data within the questionnaires.

Statistical analysis was undertaken in relation to the completed questionnaires: the data for this analysis can be found within Appendix G.

Survey Location:	Number of people who undertook the survey:
Carlisle	67
Penrith	58
Kendal	43
Workington	77
Whitehaven	69
Barrow-in-Furness	51
Total:	365

Table 16: The number of participants who undertook the questionnaire in each location

Question1: Do you live in Cumbria?

Survey Location:	Do you live in Cumbria?	
	Yes:	No:
Carlisle	51	16
Penrith	50	8
Kendal	25	18
Workington	75	2
Whitehaven	62	7
Barrow-in-Furness	49	2
Total:	312	53

Table 17: The numbers of people who live in Cumbria within each survey location

Question 2: In which District Council area do you live?

Survey Location:	In which District Council do you live?						
	Allerdale:	Barrow:	Carlisle:	Copeland:	Eden:	South Lakeland:	Elsewhere:
Carlisle	0	0	39	10	2	0	16
Penrith	1	0	7	0	32	10	8
Kendal	0	3	0	0	12	10	18
Workington	63	0	0	5	2	5	2
Whitehaven	10	0	5	47	0	0	7
Barrow-in-Furness	0	42	0	0	7	0	2
Total:	74	45	51	62	55	20	53

Table 18: The numbers of people surveyed who live within each administrative district

Question 3: Are you aware of the planning application for a VLLW landfill disposal site at Keekle Head?

Survey Location:	Are you aware of the planning application for a VLLW landfill disposal site at Keekle Head?	
	Yes	No
Carlisle	22	45
Penrith	2	56
Kendal	1	42
Workington	34	43
Whitehaven	52	17
Barrow-in-Furness	0	51
Total:	111	254

Table 19: The numbers of people surveyed aware of the Keekle Head planning application

Question 4: If yes, how much do you feel you know about the planning application at Keekle Head?

Survey Location:	If yes to Question 3, how much do you feel you know about the planning application at Keekle Head?			
	I know a lot about it:	I know a fair amount about it:	I know just a little about it:	I have heard of this but know almost nothing about it:
Carlisle	0	0	15	7
Penrith	0	0	1	1
Kendal	0	0	1	0
Workington	0	19	9	6
Whitehaven	0	25	17	10
Barrow-in-Furness	0	0	0	0
Total:	0	44	43	24

Table 20: The awareness of the Keekle Head planning application

Question 5: Are you aware of the differences in radioactivity levels between HLW and VLLW? Or would you classify all radioactive waste under one category?

Survey Location:	Are you aware of the differences in radioactivity levels between HLW and VLLW?		
	Yes:	No:	One Category:
Carlisle	23	32	12
Penrith	12	34	12
Kendal	0	0	43
Workington	16	0	61
Whitehaven	15	3	51
Barrow-in-Furness	10	5	36
Total:	76	74	215

Table 21: The awareness of radioactivity levels for each survey location

Question 6: Do you believe a VLLW disposal site at Keekle Head should be built?

Survey Location:	Do you believe a VLLW disposal site at Keekle Head should be built?	
	Yes:	No:
Carlisle	17	50
Penrith	12	46
Kendal	5	38
Workington	2	75
Whitehaven	1	68
Barrow-in-Furness	35	16
Total:	72	293

Table 22: The numbers of people surveyed who believe a VLLW disposal site at Keekle Head should be built

Question 7: If yes / no, the reasons behind your choice?

If Yes to Question 6

Survey Location:	The reasons behind your choice for Question 6				
	Bring jobs to West Cumbria:	Bring economic investment to West Cumbria:	May provide infrastructure: improve	Increase the sustainability of the nuclear industry within West Cumbria:	Create a world class environment for nuclear development in West Cumbria:
Carlisle	12	0	3	2	0
Penrith	0	0	5	7	0
Kendal	0	0	0	3	2
Workington	2	0	0	0	0
Whitehaven	1	0	0	0	0
Barrow-in-Furness	22	0	10	3	0
Total:	37	0	18	15	2

Table 23: Reasoning behind accepting the Keekle Head Development

If No to Question 6

Survey Location:	The reasons behind your choice for Question 6				
	Absence of information relating to the project:	Lack of trust in the decision making bodies:	Poor prospect of finding suitable geology:	Do not want nuclear waste disposed of in my back yard:	Health impacts related to nuclear waste:
Carlisle	33	14	0	0	0
Penrith	0	22	0	0	24
Kendal	16	12	0	0	10
Workington	0	0	0	75	2
Whitehaven	0	0	0	69	0
Barrow-in-Furness	12	1	1	0	2
Total:	61	49	1	144	38

Table 24: The numbers of people surveyed against the Keekle Head proposal and their reasoning

Question 8: Are you aware of the reasoning behind the rejection by Cumbria County Council of the Keekle Head project?

Survey Location:	Are you aware of the reasoning behind the rejection by Cumbria County Council of the Keekle Head project?	
	Yes:	No:
Carlisle	6	61
Penrith	0	58
Kendal	3	40
Workington	18	59
Whitehaven	14	55
Barrow-in-Furness	0	51
Total:	41	324

Table 25: The numbers of people aware of the reasoning behind CCC's rejection of the Keekle Head proposal

4.2 Questionnaire analysis

Overall 365 people completed the questionnaire across Cumbria, with only 83% living in Cumbria at the time it was undertaken. This is a higher proportion than was initially anticipated and could be as a result of undertaking the questionnaire in town / city centre locations where the likelihood of only 'local' views being established is weakened. The area with the lowest respondent rate was Kendal which was expected due to its relative isolation to nuclear facilities on the west coast of Cumbria, and potentially lack of local publicity in comparison to other areas. The highest areas of respondents were Workington and Whitehaven which once again was expected: this is due to the majority of nuclear facilities and heritage (Sellafield, LLWR, and Studsvik etc) being located in this region, and a greater depth of feeling. The accessibility of the region by road is a key identifier with the number of people who wished to respond, with the closer to the nuclear developments in Allerdale and Copeland having the highest numbers. This is detailed in the table below which compares the distances by road from the questionnaire locations to Sellafield:

Questionnaire Location:	Distance in miles to Sellafield:	Number of respondents:
Whitehaven	9.9	69
Workington	17.6	77
Carlisle	47.5	67
Penrith	53.6	58
Kendal	58.7	43
Barrow-in-Furness	43.7	51

Table 26: Questionnaire locations distance to Sellafield using the AA Route Planner (AA, 2013)

A surprise from the results was that overall Allerdale had a larger number of respondents than Copeland; this contradicts the argument that proximity to a nuclear establishment will bring a larger responsive rate. An awareness issue is prevalent throughout Cumbria as only 30% of people surveyed were aware of the Keekle Head planning application, but the area with a highest knowledge was Whitehaven which could be due to its proximity to the development. Within the 30% who had an awareness of the project; 0 % felt they knew a lot about the project and 22% almost nothing. This is a telling result as it suggests that media and council communications of the nuclear project were ineffective and did not help to educate local people. To provide further clarity on the lack of education in relation to nuclear related issues in Cumbria, 59% of people categorised all radioactive waste under 'one category', and 21% thought they were well aware of the differences. This is exceptionally low considering the nuclear heritage and legacy in Cumbria; a much higher awareness was expected given these factors.

The results also stated that 80% of respondents believe a VLLW landfill disposal site at Keekle Head should not be built, with the greatest opposition in Workington and Whitehaven. Of those people who would accept a disposal site at Keekle Head; 51% would because they thought it would bring jobs to West Cumbria, and 25% thought it may provide infrastructure improvements. This is as expected as the nuclear industry is one of the largest employers within Cumbria, and given the economic downturn at present, any new jobs created in the county are sought after. The people surveyed who would reject the Keekle Head development main reason was because of the NIMBY phenomenon (49%), and 21% stating a lack of information on the subject.

A surprising result was that only 13% would reject the development on health grounds as nuclear related developments tend to have a negative perception on this issue. However, 17% mistrusted the decision making bodies (local councils) to make the correct decisions and inform the local communities; with the highest mistrust located in Penrith (Eden). NIMBYism is the greatest issue in West Cumbria along with education levels, as with higher education levels it could be suggested that the NIMBY responses could decrease. This point is highlighted through only 11% of people surveyed having an awareness of the reasoning why Keekle Head was rejected.

4.3 Hypotheses Conclusions

The results from the hypotheses testing have a potential limitation in that a P-value of 0.000 may be correct as Minitab only displays results to three decimal places, and so the value may be very small but indicate a very significant result. One of the requirements of Chi Square is that there is no frequencies (counts) less than 3 and only one less than 5, thus Minitab warning that results may be compromised. The dataset collected has several 0 responses for several factors; therefore the results are very useful and will be described.

Hypothesis Number:	Result:
1	The statistical analysis through Chi Square created a P-value of 0.000: therefore the null hypothesis is accepted as the P-value is less than 0.05. This therefore means that the proximity to the Keekle Head development and awareness of the project are not independent, and has a relationship with one another.
2	The statistical analysis through Chi Square created a P-value of 0.000: therefore the null hypothesis is accepted as the P-value is less than 0.05. This therefore means that the proximity to nuclear sites in Cumbria and awareness of the differing levels of radioactivity are not independent from one another.
3	The statistical analysis through Chi Square created a P-value of 0.000: therefore the null hypothesis is accepted as the P-value is less than 0.05. This therefore means that the proximity to the Keekle Head development and acceptance of the development are not independent, and has a relationship with one another.
4	The statistical analysis through Chi Square created a P-value of 0.000: therefore the null hypothesis is accepted as the P-value is less than 0.05. This therefore means that the proximity to nuclear developments and the rejection reason being NIMBY are not independent.
5	The statistical analysis through Chi Square created a P-value of 0.000: therefore the null hypothesis is accepted as the P-value is less than 0.05. This therefore means that the proximity to proposed nuclear developments and the awareness of the rejection of the Keekle Head development are not independent from one another.

Table 27: Hypotheses conclusions

5 Discussion

5.1 Managing Radioactive Waste Safely

5.1.1 Pre –decision

The role of the West Cumbria Managing Radioactive Waste Safely Partnership had been to give the Councils involved its opinions on the issues that would be involved in moving to the next stage of the MRWS process (WCMRWSP, 2012). The Partnership itself was not taking any decisions; its role was an advisory one of fact finding and research gathering (WCMRWSP, 2012). However, resulting from the partnership, prior to any decisions being made whether or not to progress to stage 4 (the objective is to identify one or more sites for undertaking surface-based investigations to test their suitability as the potential location for a geological disposal facility) (WCMRWSP, 2012), a number of issues can be raised for discussion.

An issue raised by Radiation Free Lakeland was the validity of the IPSOS Mori poll. It was claimed there were too many unanswered questions to provide a clear mandate to move forward, as 35% of people surveyed knew little, or nothing on the subject they were voting for. The issue of ‘knowledge’ is an interesting byproduct of the survey as this issue is not taken into account in any other circumstances (e.g. general elections), and so in this instance, why should it be taken into account? Furthermore, the IPSOS Mori poll of 3000 is statistically robust and would result in 95% (+/- 3) accuracy which is the norm for such surveys. The opinion poll did suggest that support for progressing to Stage 4 was linked to awareness, as those who were more aware of the search for a site to host a GDF were more likely to support it.

The geology of Cumbria is also an issue which was been widely debated during the MRWS consultation in Cumbria. The International Atomic Energy Association, within its guidelines, state not to build a GDF in areas known to have complex geology: and this is the current knowledge within Cumbria. However, this was established during the NIREX process in 1997 when it was decided that the Longland’s Farm area, and not the whole of Cumbria, did not have suitable geology. With advances in science and a wider search area available, Cumbria should have progressed to Stage 4 in order to conduct a geological survey to determine geological suitability. There was also the argument that if Cumbria did not progress to the stage 4, how can questions be answered posed against a GDF?

Currently, 70% of the HAW in the UK is located at Sellafield, and it is accepted by CoRWM that in the short term, that the waste would be safer to be stored underground rather than on the surface: negating the possibility of terrorist attacks as an example. The impact of not dealing with the waste however is unknown; this is an issue which will require further discussion as the baseline scenario. If a GDF were to be sited in Cumbria, retrievability would have to be clarified from the Government and the MRWS White Paper must be legislated to provide legal guarantees of the process, along with the right of withdrawal until construction.

The image of the Lake District National Park is seen as a major stumbling block in any development due to the potential tarnishing of the tourism industry because of the perception of nuclear waste. Any potential community benefits received by Cumbria to negate any negative impacts is widely seen as a 'bribe' to persuade the councils to accept such a facility for offloading a problem, and Cumbria maximising potential benefits. There are three categories of 'benefit' that can be received which are described within the table below.

Category of 'benefit':	How it is used?
Engagement Package	To fund participation within the process
Impact Mitigation	Brand protection and to finance necessary infrastructure
Community Benefits Package	Additional benefits

Table 28: Categories of community 'benefit' (Griffin, 2012)

In September 2012 the MP for Copeland, Jamie Reed, pre-empted the Cabinet decision on MRWS participation to the media (Whitehaven News, 2012). Jamie Reed MP 'leaked' the Cabinet decisions within Cumbria by saying that the Cabinets would vote against hosting a GDF facility and how this could affect nuclear new build in Cumbria (Whitehaven News, 2012): this can be seen as prejudicing the Cabinet's decision. There was already a distinct split amongst councillors within Cumbria as to whether or not to progress to the next stage, and it could be deemed that pressure is being placed upon Cumbria to accept the proposal. Equally, pressure from opposition groups via letters to council members, and through public events, made the decision for councillors uncomfortable.

Overall, the MRWS process is designed not to find a suitable site, just who is willing to accept the flaws of the development. The voluntarism approach may not be able to find a suitable site within Cumbria, but, if a repository was imposed upon an area that was suitable; this would be equally as unaccepted. This poses the question of 'how should DECC progress? In this instance due to the nature of the process and how far 'down the line' the Government are with initiating progress with the MRWS process, the 'voluntarism' approach must continue with Allerdale and Copeland who possess a clear mandate to proceed.

5.1.2 Decision

Cumbria County Council, Copeland Borough Council and Allerdale Borough Council voted on continuation of participation to stage 4 of the MRWS process on 30 January 2013 (CCC, 2013). After attendance of the Cabinet meeting at Cumbria County Council, first observations were of the location of the meeting being highly inappropriate due to the small viewing capacity. This was due to the large volume of members of the public wishing to view proceedings due to extensive media coverage both for, and against. Opposition groups viewed the location choice as provocative through limiting the viewing capacity to 17, when 40 people had registered to ask Cabinet questions (CCC, 2013). The members of the public who registered to answer questions were located within an adjacent meeting room with a live audio feed. These circumstances resulted in an apparent air of exclusivity, impression of information being withheld and lack of transparency. If the room had been larger to incorporate a greater viewing audience, this feeling could have been avoided and a sense of openness created.

Upon commencement of the Cabinet meeting, options 1 and 3 of the Cabinet paper recommendations were withdrawn in a motion delivered by Cllr. Anthony Markley (CCC, 2013). This resulted in the district of Allerdale being withdrawn from the process immediately, which seemed the correct decision as public support was minimal (SPAND, 2012). The remaining options (2 and 4) were then further amended so that option 2 in Copeland excluded searching for a GDF site in the Lake District National Park, and would focus on the area immediately surrounding Sellafield. This seemed a logical amendment put forward by Cllr. Tim Knowles (Environment Portfolio holder) as it removed the uncertainty with regard to the Lake District. Further to this, Leader of the Council Cllr. Eddie Martin proposed that the amendment to option 4 to include not to participate furthermore in the MRWS process and to encourage the UK Government to make necessary investment to improve surface storage facilities at Sellafield (CCC, 2013). However upon evaluation, this can be seen as anti-industry as without a solution for the long-term disposal of radioactive wastes, there will be further uncertainty regarding nuclear new build and a possible national grid extension in Cumbria.

It is an important factor to remember that this was not a vote on whether Cumbria should have a GDF or not, as publicly suggested; it is to decide on whether to look at the potential suitability of the geology of the area. Opposition groups in Cumbria have presented information to residents which is concerning as it has been presented as fact, whilst in fact it is scaremongering and creating false public perceptions. Any suggestions that there are plans at this stage to carry out detailed geological investigations at: Ennerdale, Silloth or anywhere else in Cumbria, is false. Some opponents of a GDF have already decided that the geology in Cumbria is not suitable. However, the expert body of academic thinking on geology (Geological Society of London), and large parts of the scientific community, argue that not enough is known about the geology of Cumbria to rule anything in or out, and only when further investigations are undertaken will it be known.

5.2 Keekle Head radioactive waste disposal

Following on from Cumbria County Council opposing plans to dispose of Very Low Level nuclear waste at Keekle Head, a number of issues need to be highlighted, and policies upheld for moving forward. In March 2007, the as then new Labour government changed the previous UK Government policy of preventing large scale disposal of nuclear waste in landfill, thus opening up the possibility of wastes being sent to landfill sites. A precedent has been set with the approval of a nuclear landfill site against the wishes of local people at Kings Cliffe, Northamptonshire. 'Northamptonshire County Council unanimously rejected the plan' in March 2010 before the then Communities Secretary (Eric Pickles) overturned their decision and approved the disposal of nuclear wastes at the site.

Cumbria County Council opposes the position regarding VLLW disposal as it is opposed to radioactive wastes proliferation in Cumbria. This position is supported by Radiation Free Lakeland, and it can be suggested that to prevent such plans from re-emerging into the future; the UK Government must be urged to reinstate the law preventing the disposal of nuclear wastes away from the point of production. Endecom (the Keekle Head site developer) gave the reason for it not being possible to dispose of VLLW at Sellafield as: 'there is insufficient space on the site to construct a disposal facility and large areas of already contaminated land would have to be excavated'. This however would seem a logical site for such a disposal due to the higher than average contamination of the land compared to a 'green field' site at Keekle Head. Why should more land be contaminated within Cumbria when a perfectly usable site that is already contaminated exists: of which the logic behind this opinion is accepted by Greenpeace; Friends of the Earth and Radiation Free Lakeland.

Moving forward with the issue of managing VLLW disposal in Cumbria, Cumbria County Council should continue to maintain their stance and lobby the UK Government to revoke the 'exempt' law allowing VLLW into what is effectively a landfill site. All nuclear sites should contain and manage their own wastes including HAW, not proliferate waste elsewhere creating potential risks associated with 'waste miles'.

6 Conclusion

Understanding public perceptions and concerns is fundamental to gain a positive reception for the construction and acceptance of a large scale project (Aoki and Gallardo, 2012). In this context, the study conducted examined the people of Cumbria's response to hosting a facility to dispose of VLLW in a landfill site at Keekle Head, compared to a recent study by IPSOS Mori on perceptions towards hosting a GDF. The results represent local people's attitudes prior to widespread media coverage of nuclear issues within Cumbria, which began in August 2012 to coincide with the decision from Cumbria County Council, along with Allerdale and Copeland Borough Council's, on the continuation of the MRWS process. It is concluded that people were not well aware of the issues involved in disposing radioactive wastes within Cumbria: whether they be HAW in a GDF, or VLLW at a landfill site, although the influence of the media and political debate will have increased knowledge in the aftermath of the questionnaire, and is a limitation.

The research indicates the need to strengthen the trust between the general public and decision making bodies such as the UK Government and local councils. Distrust is a common theme in terms of the tiers of Government: perception of other tiers of Government is generally negative; parishes do not trust districts, which in turn do not trust counties. Confidence in site selection and policy management of nuclear disposal facilities is low, but, with greater communication and consultation with local communities, the government still has the opportunity to achieve greater credibility. It is likely that informal consultations and more active involvement of citizens in the decision making process will make a significant contribution to improving acceptance and confidence in the process of disposing radioactive wastes, particularly with VLLW disposal developments.

In terms of acceptability, the study revealed a stark contrast in levels of support for the Keekle Head project. Only a small percentage (20%) of people would accept hosting a VLLW disposal site, with the majority opposing the proposal of siting a disposal site near their place of residence. In this context, the over-riding question which needs to be addressed is whether or not the NIMBY attitude can be overcome. This theory can then be linked to all nuclear developments and especially the prospect of hosting a GDF in the future. Regardless of the decision to progress to MRWS Stage 4, the same issues are prevalent and these are: lack of education to be able to make informed choices on the disposal of radioactive wastes and the level of 'community benefits' that can contribute towards reducing the NIMBY effect.

The conclusion is that financial gain through new infrastructure, or improved healthcare facilities in West Cumbria through 'community benefits' have the potential to be attractive enough to overcome the fear of hosting facilities to dispose of radioactive wastes. Improved education with regard to nuclear issues can act as a resolution to the NIMBY policy; this challenge however requires efforts to communicate effectively with stakeholders and communities. Transparency is also an important factor within decision making bodies as explaining decisions and processes in a transparent manner (stating advantages and disadvantages of a project) and engaging residents in decision making early and consistently, can improve the acceptability of such projects.

The implications of Cumbria potentially rejecting a GDF were that hopes of building a new generation nuclear power plant at Moorside, adjacent to Sellafield, could suffer a setback (The Times, 2012). Sir David King (Chief Scientific Advisor to Tony Blair and Gordon Brown), warned that if the councils in Cumbria were to vote against the plans, it could delay talks with EDF Energy over new nuclear reactors (The Times, 2012). The proposed scheme at Moorside promises thousands of jobs and a predicted £9bn investment, which will be a major economic boost if it were to go ahead. However, politically it could be suggested that pressure is being put upon Cumbria to accept a GDF in order to secure a 'less controversial' and more widely accepted new nuclear power station. However, this proved not to be the case as Cumbria County Council used its 'veto' to stop the MRWS process.

The issue of nuclear waste disposal is potentially the most significant decision to be made within Cumbria, and thus a solution needs to be sought from the current situation. Currently 70% of the United Kingdom's HAW is stored above ground in cooling ponds at Sellafield, and managing this waste costs £1.69 billion per year (NAO, 2012). West Cumbria was the 'sole' community willing to accept a GDF, but contrary to public perceptions, potential sites had not been completely ruled out by the NIREX process as the comprehensive geological survey conducted in the 1990s only ruled out the area surrounding Longland's Farm near Sellafield. This does not 'rule out' the whole of West Cumbria, and through proceeding to Stage 4 of the MRWS process a definitive answer could have been given on the suitability of the geology of West Cumbria to host a GDF.

To relate this to the rejection of the VLLW landfill disposal site, Keekle Head was rejected as it was not needed and this was recognised by the LLWR and UK Government. However, a GDF is needed within the UK, but it can be suggested that the voluntarism approach is wrong and can result in a site willing to accept such a facility, but with the wrong geology to host it. This, according to previous literature, is the case within Cumbria unless a GDF is 'engineered' in order to meet the required safety standards expected. This was highly anticipated to be the case within Cumbria due to its complex geology.

Finally, the limitations of the study should be pointed out which prevent definitive conclusions being established across Cumbria. The number of respondents to the survey was 365 which is a very small sample, and thus it can be difficult to establish trends; but a larger survey could provide a clearer picture of the current perceptions. The results from the survey were also obtained on one day, and not spread across a wider time frame in order to capture more views from a larger variety of backgrounds, not just those on a weekend at a given location. The study therefore cannot be truly representative of public opinion but if the frequency of the questionnaire being undertaken was increased, the reliability of the conclusions can be improved. Moreover, the survey focused on a number of variables affecting the public perception towards nuclear waste. Thus, to build upon this research, it could be investigated, which and how, other parameters influence the public perception towards the risk, and how public perception evolved after the nuclear crisis in March 2011 in Fukushima, Japan.

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Appendix A
Programme of works

Appendix B

Keekle Head illustration (Endecom UK Ltd, 2012)

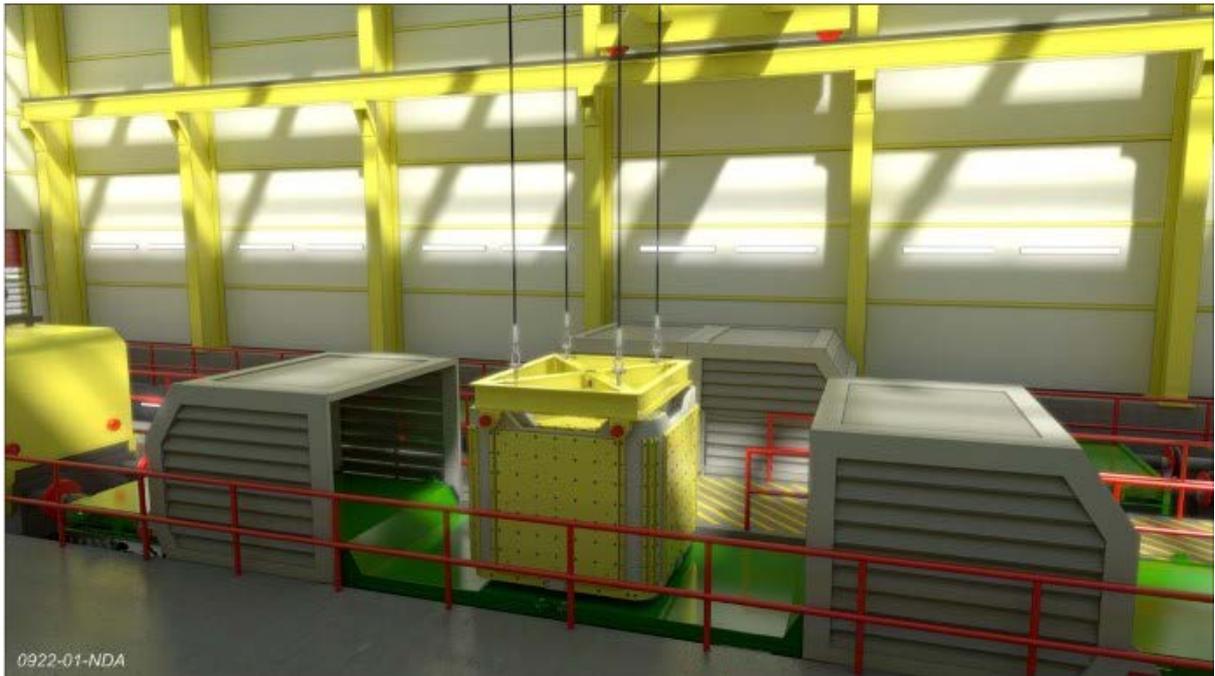


Appendix C

Geological Disposal Facility illustrations (NDA, 2012)



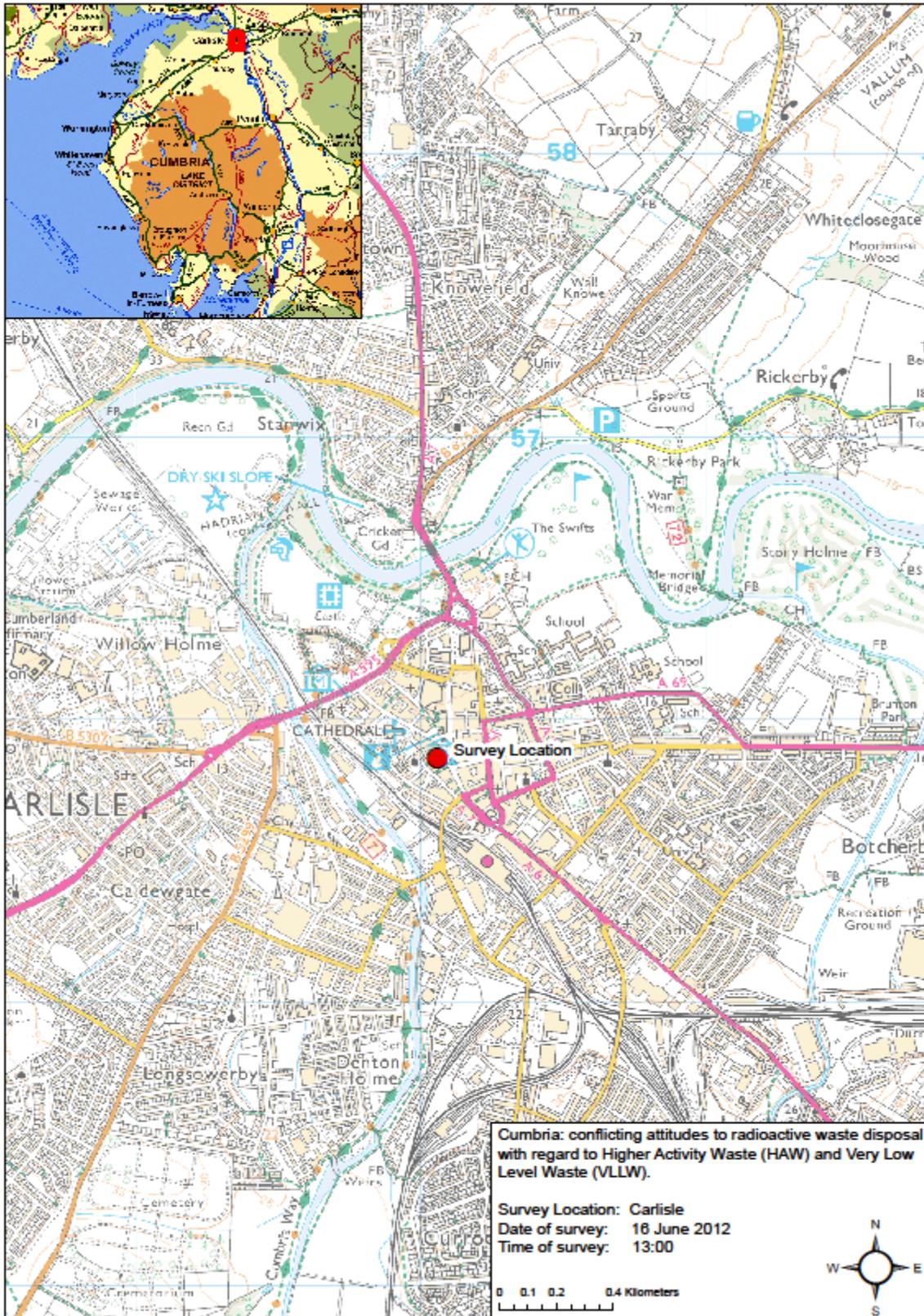
0841-01-NDA

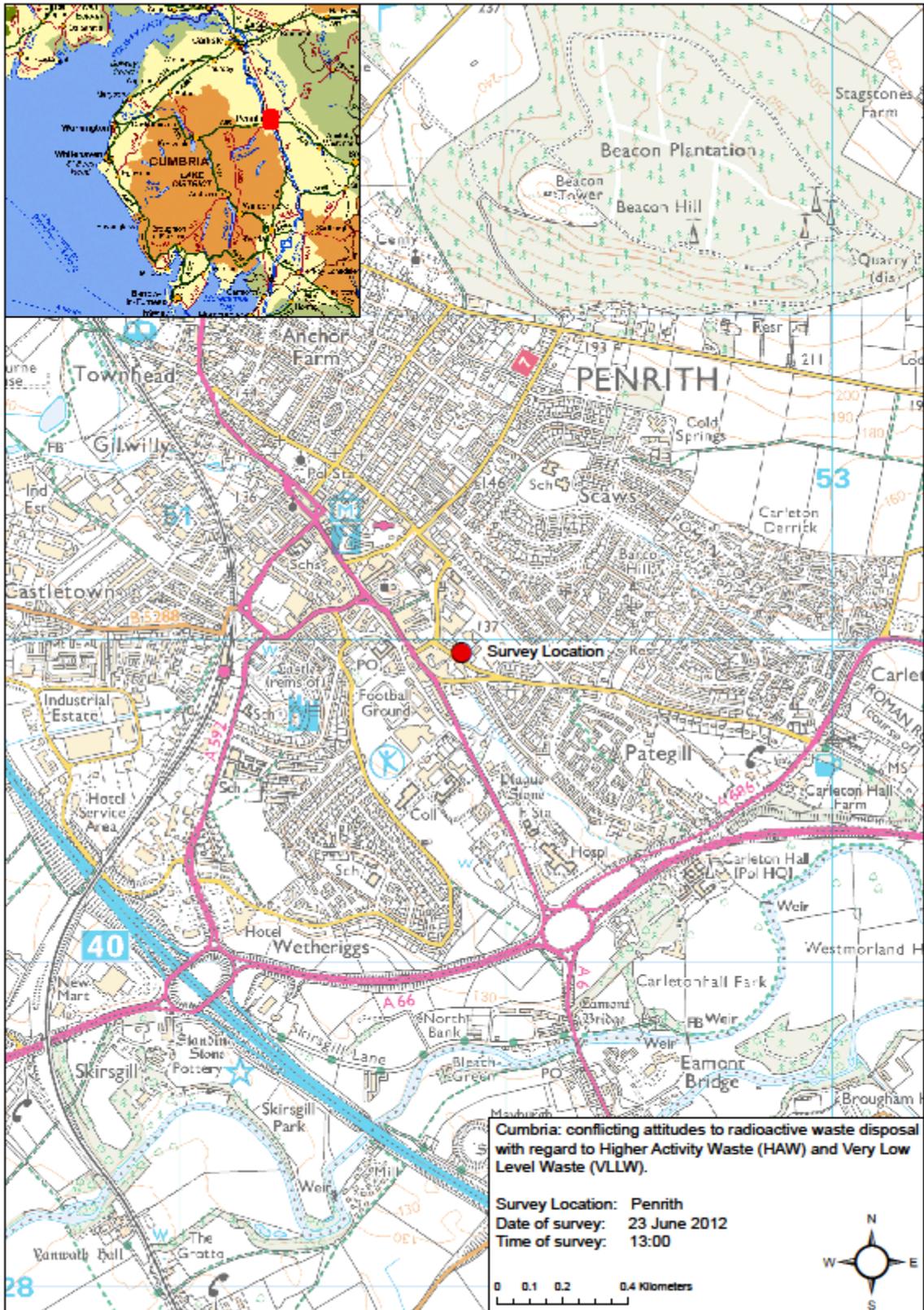


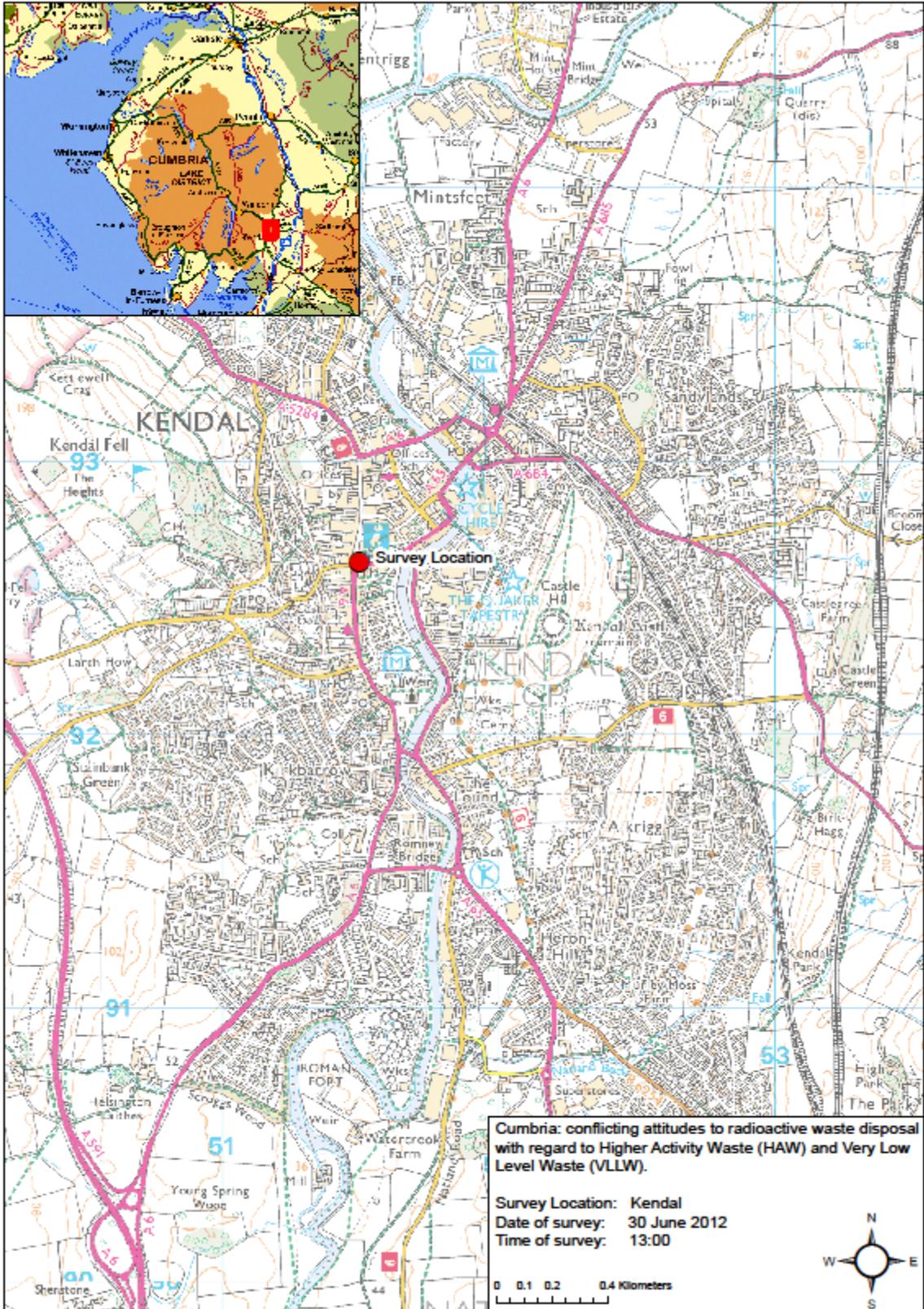
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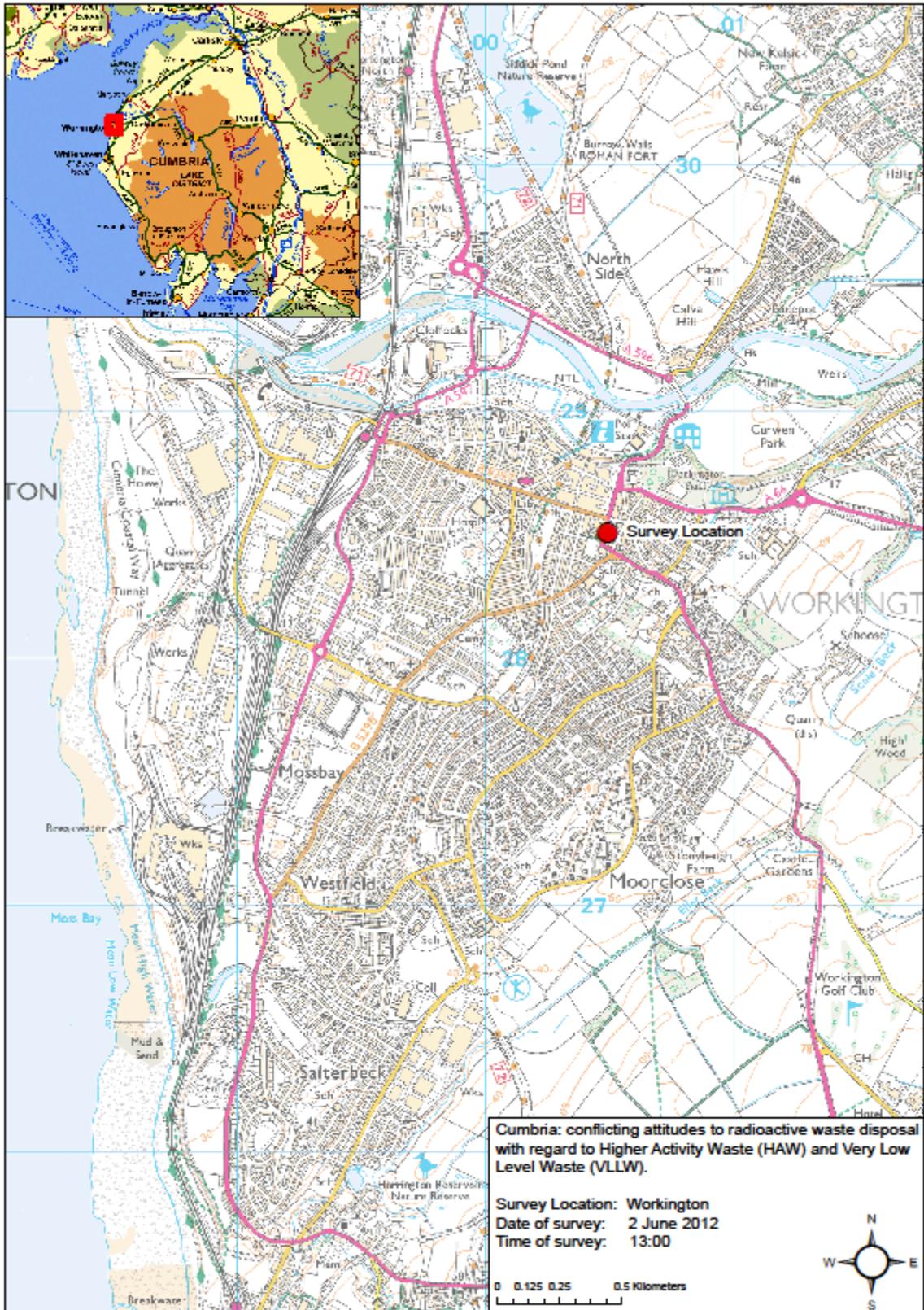
Appendix D

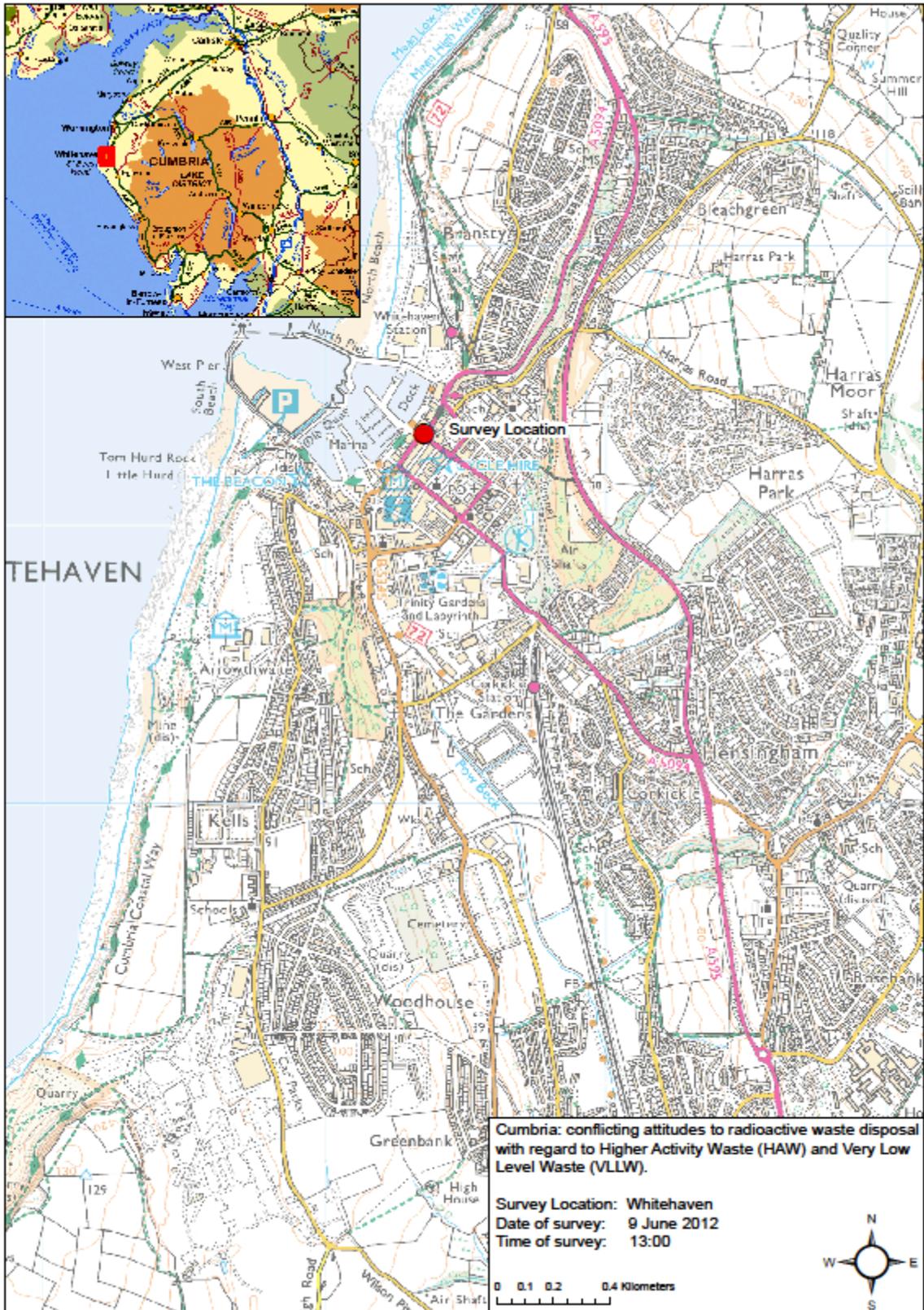
Questionnaire location maps

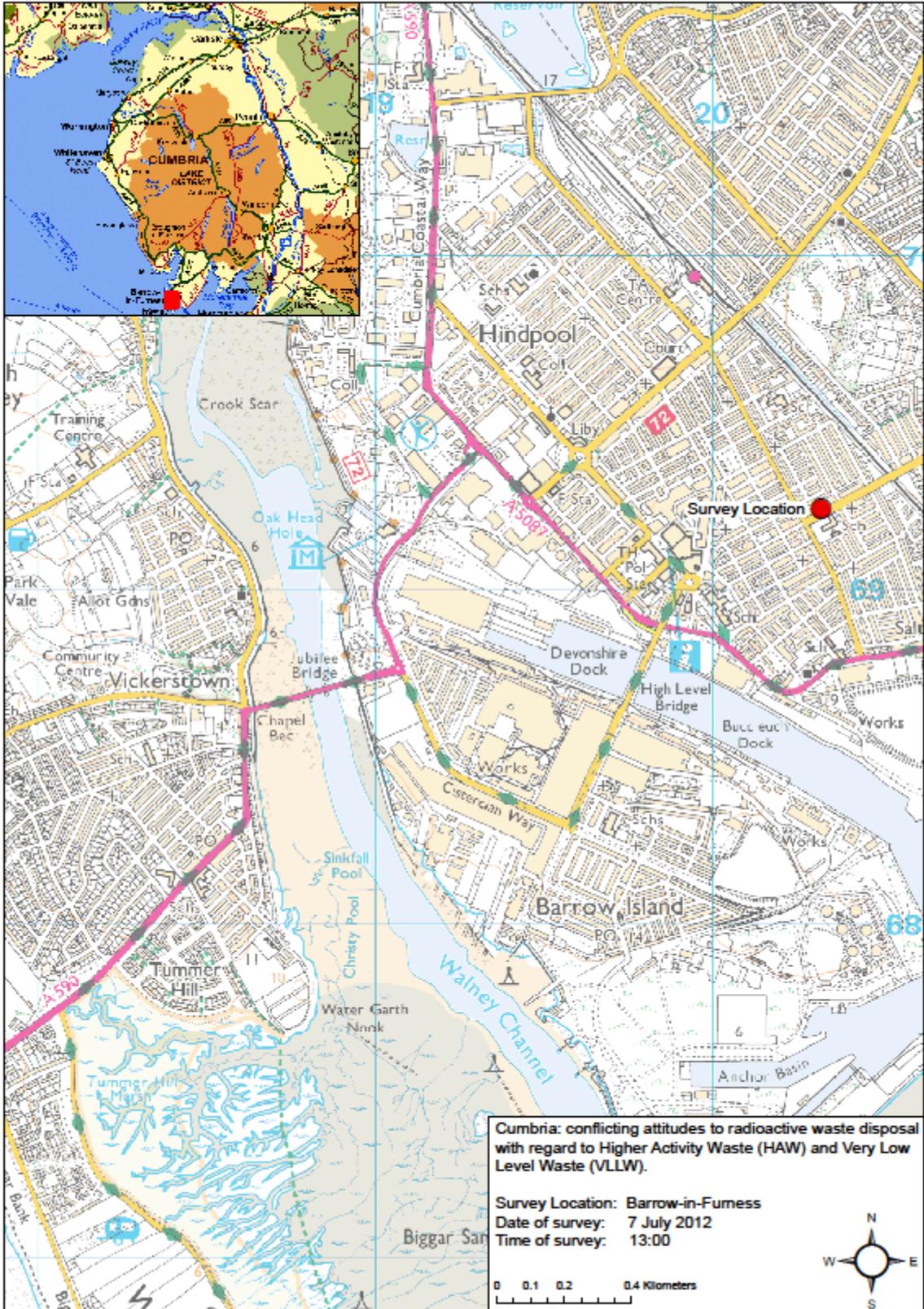














Appendix E

IPSOS Mori poll questions (WCMRWSP, 2012)

RADIOACTIVE WASTE SURVEY**PSE 3 QUESTIONNAIRE FINAL V17 (8th March 2012)**

Good morning/afternoon/evening. My name is _____ from Ipsos MORI. We are carrying out an important survey on behalf of Cumbria County Council, Allerdale and Copeland Borough Councils and other organisations. The survey is about issues around possible future developments in the area.

Ipsos MORI follows the Market Research Society Code of Conduct and all your responses will be treated in the strictest confidence. The interview lasts around 10 minutes.

Q1.	Can I just check, do you live in Cumbria? SINGLE CODE	Yes	1	CONTINUE
		No	2	THANK AND CLOSE

Q2.	And can I check, in which District Council area you live? READ OUT. SINGLE CODE	Allerdale	1	
		Barrow in Furness	2	
		Carlisle	3	
		Copeland	4	
		Eden	5	
		South Lakeland	9	
		Elsewhere	X	THANK AND CLOSE

Q2b IF Q2a NOT ANSWERED, OR REFUSED, ASK Q2b
Please could you tell me your full postcode. ADD IF NECESSARY This is just so we can analyse by where people live?
IF UNRECOGNISED. CODE DK, IF REFUSED FULL POSTCODE CODE REF.
WRITE IN

IF RESPONDENT IS UNABLE TO GIVE A FULL/ACCURATE POSTCODE THEN ASK Q2c

Q2c. In which town or village do you live?
CHECK AGAINST DATABASE. IF UNRECOGNISED. CODE DK, IF REFUSED CODE REF.
IF DK OR REFUSED THEN CLOSE, OTHERWISE CONTINUE WITH INTERVIEW.
WRITE IN

RIZZO HOUSEHOLD MEMBER SELECTION PROCESS

Firstly, please tell me how many adults, aged 16 plus, are living in this household.

WRITE IN NUMBER:
Adult selected to take part =
Record name of selected adult

READ OUT IF NECESSARY: We need to make sure that we talk to a good mix of local residents, to do this we will randomly select an adult in your household to take part in the survey.

Can I speak to {ADULT SELECTED} now?

If not available, make an appointment to call back at a convenient time.

READ OUT

I would like to talk to you about higher activity radioactive waste. Most of this type of waste in the UK is currently stored above ground at Sellafield.

The Government is looking for a community to volunteer to have a deep underground disposal facility for higher activity radioactive waste built in their area. Allerdale Borough Council, Copeland Borough Council and Cumbria County Council all said they wanted to learn more about the search for a site for a deep underground disposal facility. Initial geological screening has been carried out to check there are areas in Allerdale and/or Copeland which may be worth further investigation.

You may have seen information about this search in the newspapers, on the news or at local events.

[STOP AND PROMPT: WOULD YOU LIKE ME TO REPEAT ANY OF THAT INFORMATION?]

Q3.	How much do you feel you know about this search in West Cumbria for a potential site for a deep underground disposal facility for higher activity radioactive waste? READ OUT SINGLE CODE ONLY	
	I know a lot about it	1
	I know a fair amount about it	2
	I know just a little about it	3
	I have heard of this but know almost nothing about it	4
	I have never heard of it	5
	Don't know	99

The next stage of the process involves more detailed investigations to see if there are any suitable potential sites for a deep underground disposal facility for higher activity radioactive waste. Allerdale Borough Council, Copeland Borough Council and Cumbria County Council will each, individually, decide whether or not they should take part in the search for a potential site in the areas covered by Allerdale and/or Copeland.

IF IN ALLERDALE AREA AT Q2

Cumbria County Council and Allerdale Borough Council must both agree to go forward with the search in Allerdale for possible sites or the search will not go ahead. Both councils, on behalf of the communities they serve, will have the right to withdraw from the process if they want to, at which point the search would stop. Before they take this decision to continue to the next stage in the search for a suitable site the councils want to understand the views of local residents.

IF IN COPELAND AREA AT Q2

Cumbria County Council and Copeland Borough Council must both agree to go forward with the search in Copeland for possible sites or the search will not go ahead. Both councils, on behalf of the communities they serve, will have the right to withdraw from the process if they want to, at which point the search would stop. Before they take this decision to continue to the next stage in the search for a suitable site the councils want to understand the views of local residents.

IF IN REST OF CUMBRIA AREA AT Q2

Cumbria County Council and the local Borough Council must both agree to go forward with the search in Allerdale and/or Copeland, or the search will not go ahead. Both councils, on behalf of the communities they serve, will have the right to withdraw from the process if they want to, at which point the search would stop. Before they take this decision to continue to the next stage in the search for a suitable site the councils want to understand the views of local residents, in the rest of Cumbria as well as in Allerdale and Copeland.

[STOP AND PROMPT: WOULD YOU LIKE ME TO REPEAT ANY OF THAT INFORMATION?]

Q4. IF IN ALLERDALE SAMPLE AREA AT Q2
From what you know at the moment, do you think that Allerdale Borough Council and Cumbria County Council should or should not take part in the search for a suitable site in Allerdale for a deep underground disposal facility for higher activity radioactive waste?

IF IN COPELAND SAMPLE AREA AT Q2
From what you know at the moment, do you think that Copeland Borough Council and Cumbria County Council should or should not take part in the search for a suitable site in Copeland for a deep underground disposal facility for higher activity radioactive waste?

IF IN REST OF CUMBRIA SAMPLE AREA AT Q2
From what you know at the moment, do you think that Cumbria County Council and the local borough councils should or should not take part in the search for a suitable site in Allerdale and/or Copeland for a deep underground disposal facility for higher activity radioactive waste?

PROMPT IF NECESSARY
SINGLE CODE

Should take part in the search	1
Should not take part in the search	2
Don't know	98
Neutral	99

Q5. IF CODE 1 OR CODE 2 RESPONSE AT Q4 ASK
Why do you think the council(s) should/should not take part in the search?
IF CODE 98 OR CODE 99 RESPONSE AT Q4 ASK
Why do you say you are neutral /don't know about taking part or not in the search?
WRITE IN. PROBE FULLY "For what other reasons?"

Finally I'd like to ask some questions about you and your household to help us understand how different types of people feel about this. No individuals will be identified.

Q6. GENDER (DO NOT ASK) SINGLE CODE	Male	1
	Female	2

Q7. How old are you? IF RESPONDENT REFUSES: Could you tell me in which of the following bands your age falls into? WRITE IN <input type="checkbox"/> <input type="checkbox"/>	SINGLE CODE	Under 16	1
		16-19	2
		20-24	3
		25-34	4
		35-44	5
		45-54	6
		55-64	7
		65+	8
		Refused	9

Q8. And are you... SINGLE CODE ONLY, READ OUT	Full time working 30 hours or more a week, including full time self employed	1	
	Working part time 8 - 29 hours a week, including part time self employed	2	
	Not working (under 8 hrs) - homemaker	3	
	Not working (under 8 hrs) - unemployed (registered)	4	
	Not working (under 8 hrs) - unemployed (not registered but looking for work)	5	
	Not working (under 8 hrs) - retired	6	
	Not working (under 8 hrs) - student	7	
	Not working (under 8 hrs) - other (inc. disabled)	8	
	DO NOT READ OUT	Don't know	99
		Refused	98

Q9. ASK PART A IF RESPONDENT IS EMPLOYED FULL OR PART TIME OR SELF-EMPLOYED OR RETIRED A1 Q8 a) Are you employed by any of the following... ? READ OUT MULTICODE OK b) Are you/were you employed by any of the following... ? READ OUT MULTICODE OK ASK ALL c) Are any of your close family members, relations or friends, employed by any of the following... ? READ OUT MULTICODE OK		a/b Respondent	c Other
	The nuclear industry		1
	Allerdale Borough Council, Copeland Borough Council or Cumbria County Council	2	2
	The Ministry of Defence (MoD)/ Armed Forces	3	3
	Any other Government Department, agency or regulator	4	4
	Any Environmental campaign group (e.g. Greenpeace, Friends of the Earth)	5	5
	None of these	6	6
	Don't know	99	99

Q10.	How long have you lived in (COUNCIL AREA FROM Q2)?		
READ OUT		Under 1 year	1
SINGLE CODE		1-2 years	2
		3-5 years	3
		6-10 years	4
		11-20 years	5
		21+ years	6
		Don't know	99
Q11.	In ten years' time, where do you think you will be living?		
READ OUT		in the same house/flat I am living in now	1
SINGLE CODE		Somewhere in the same borough as I am living in now	2
		Somewhere else in Cumbria	3
		Somewhere outside Cumbria but in the UK	4
		Somewhere else outside the UK	5
DO NOT READ OUT		Not expecting to be alive	6
		Don't know	99
Q12.	IF POSTCODE NOT ALREADY PROVIDED AT Q2b ASK Q12.		
	Please could you tell me your full postcode. ADD IF NECESSARY This is just so we can analyse by where people live?		
	IF UNRECOGNISED, CODE DK, IF REFUSED FULL POSTCODE CODE REF.		
	WRITE IN		
	IF RESPONDENT IS UNABLE TO GIVE A FULL/ACCURATE POSTCODE THEN ASK Q12b		
Q12b.	In which town or village do you live?		
	CHECK AGAINST DATABASE. IF UNRECOGNISED, CODE DK, IF REFUSED CODE REF.		
	WRITE IN		
	IF RESPONDENT'S HOME LOCATION IS UNRECOGNISED, CODE DK, IF REFUSED CODE REF, THEN ASK Q12c		
Q12c.	Can I just check that you live in the District Council area of ...?		
READ OUT FROM SAMPLE SHEET		Allerdale	1
SINGLE CODE		Barrow in Furness	2
		Carlisle	3
		Copeland	4
		Eden	5
		South Lakeland	6
		Elsewhere	X

THANK & CLOSE

Appendix F
Completed questionnaires

4. If yes, how much do you feel you know about the planning application at Keekle Head?

I know a lot about it	
I know a fair amount about it	
I know just a little about it	
I have heard of this but know almost nothing about it	
I have never heard of it	

5. Are you aware of the differences in radioactivity levels between HLW and VLLW? Or would you classify all radioactive waste under one category?

Yes	
No	
One Category	

The differences in radioactivity between VLLW and HAW are determined in the amount of radiation given off from the waste and time it takes for the waste to decay. Higher Activity Wastes are at the highest end of the scale and give off the most radiation and take the longest to decay whilst giving off the most heat. Very Low Level Waste on the other hand; this waste is at the lowest end of the scale that is classed as radioactive and thus gives off the least radiation and generates no heat whilst decaying.

6. Do you believe a VLLW disposal site at Keekle Head should be built?

Yes	
No	

7. If yes / no, the reasons behind your choice? (multiple selections allowed)

Yes	
Bring jobs to West Cumbria	
Bring economic investment to West Cumbria	
May provide infrastructure improvements through community benefits packages	
Increase the sustainability of the nuclear industry within West Cumbria	
Can help to create a 'world class environment' for nuclear development in West Cumbria	
No	
Absence of information relating to the project	
Lack of trust in the decision making bodies	
Poor prospect of finding suitable geology	
Do not want nuclear waste disposed in my back yard	147 147 147 147 147 147 147 147
Health impacts related to radioactive waste	11

8. Are you aware of the reasoning behind the rejection by Cumbria County Council of the Keele Head project?

Yes	147 147 147 11
No	147 147 147 147 147 147 147 147 147 147 147 147 11

The reason why Cumbria County Council rejected the Keele Head planning application was because of the lack of need for such a facility as underlined by Low Level Waste Repository Ltd.

Thank you for taking the time to complete this survey.

7. If yes / no, the reasons behind your choice? (multiple selections allowed)

Yes	
Bring jobs to West Cumbria	
Bring economic investment to West Cumbria	
May provide infrastructure improvements through community benefits packages	
Increase the sustainability of the nuclear industry within West Cumbria	
Can help to create a 'world class environment' for nuclear development in West Cumbria	
No	
Absence of information relating to the project	
Lack of trust in the decision making bodies	
Poor prospect of finding suitable geology	
Do not want nuclear waste disposed in my back yard	1111 1111 1111 1111 1111 1111 1111 1111 1111 1111
Health impacts related to radioactive waste	1111 1111 1111 1111 1111

8. Are you aware of the reasoning behind the rejection by Cumbria County Council of the Keele Head project?

Yes	1111 1111 1111
No	1111 1111 1111 1111 1111 1111 1111 1111 1111 1111

The reason why Cumbria County Council rejected the Keele Head planning application was because of the lack of need for such a facility as underlined by Low Level Waste Repository Ltd.

Thank you for taking the time to complete this survey.

Cumbria: conflicting attitudes to radioactive waste disposal with regard to Higher Activity Waste (HAW) and Very Low Level Waste (VLLW)

Location: Penrith town centre (opposite the Barclays Bank)

Good morning/afternoon/evening. My name is Peter Allan from the University of Central Lancashire (UCLan). I am carrying out an important piece of research on behalf of UCLan and Cumbria County Council. The research is about issues around possible future developments in the area.

The aim of the research is to determine public awareness of the Keele Head and Managing Radioactive Waste Safely (MRWS) projects in relation to perspectives as to whether they should go ahead with reasoning behind your view.

The research follows the Market Research Society Code of Conduct and all your responses will be treated in the strictest confidence. The questionnaire lasts around 10 minutes.

1. Do you live in Cumbria?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

2. In which District Council area do you live?

Allerdale	<input type="checkbox"/>
Barrow-in-Furness	<input type="checkbox"/>
Carlisle	<input type="checkbox"/>
Copeland	<input type="checkbox"/>
Eden	<input type="checkbox"/>
South Lakeland	<input type="checkbox"/>
Elsewhere	<input type="checkbox"/>

A few examples of Very Low Level Waste produced from the nuclear industry are: concrete, steel, glass, stone, pipes and pumps. This waste has the same radioactivity as the 'normal' level of the Earth's crust excluding areas where Radon is present, therefore is considered to be safe for disposing of in a landfill site with protective measures.

3. Are you aware of the planning application for a VLLW landfill disposal site at Keele Head?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

7. If yes / no, the reasons behind your choice? (multiple selections allowed)

Yes	
Bring jobs to West Cumbria	
Bring economic investment to West Cumbria	
May provide infrastructure improvements through community benefits packages	1244
Increase the sustainability of the nuclear industry within West Cumbria	1244 11
Can help to create a 'world class environment' for nuclear development in West Cumbria	
No	
Absence of information relating to the project	
Lack of trust in the decision making bodies	1244 1244 1244 1244 11
Poor prospect of finding suitable geology	
Do not want nuclear waste disposed in my back yard	
Health impacts related to radioactive waste	1244 1244 1244 1244 111

8. Are you aware of the reasoning behind the rejection by Cumbria County Council of the Keekle Head project?

Yes	No
	1244 1244 1244 1244 1244 1244 1244 1244 1244 1244 11

The reason why Cumbria County Council rejected the Keekle Head planning application was because of the lack of need for such a facility as underlined by Low Level Waste Repository Ltd.

Thank you for taking the time to complete this survey.

Cumbria: conflicting attitudes to radioactive waste disposal with regard to Higher Activity Waste (HAW) and Very Low Level Waste (VLLW)

Location: Kendal town centre (on the corner of Lowther Street and Highgate)

Good morning/afternoon/evening. My name is Peter Allan from the University of Central Lancashire (UCLan). I am carrying out an important piece of research on behalf of UCLan and Cumbria County Council. The research is about issues around possible future developments in the area.

The aim of the research is to determine public awareness of the Keele Head and Managing Radioactive Waste Safely (MRWS) projects in relation to perspectives as to whether they should go ahead with reasoning behind your view.

The research follows the Market Research Society Code of Conduct and all your responses will be treated in the strictest confidence. The questionnaire lasts around 10 minutes.

1. Do you live in Cumbria?

Yes	
No	

2. In which District Council area do you live?

Allerdale	
Barrow-in-Furness	
Carlisle	
Copeland	
Eden	
South Lakeland	
Elsewhere	

A few examples of Very Low Level Waste produced from the nuclear industry are: concrete, steel, glass, stone, pipes and pumps. This waste has the same radioactivity as the 'normal' level of the Earth's crust excluding areas where Radon is present, therefore is considered to be safe for disposing of in a landfill site with protective measures.

3. Are you aware of the planning application for a VLLW landfill disposal site at Keele Head?

Yes	1
No	

4. If yes, how much do you feel you know about the planning application at Keele Head?

I know a lot about it	
I know a fair amount about it	
I know just a little about it	1
I have heard of this but know almost nothing about it	
I have never heard of it	100% 100% 100% 100% 100% 100% 100% 100% 100% 100%

5. Are you aware of the differences in radioactivity levels between HLW and VLLW? Or would you classify all radioactive waste under one category?

Yes	100% 100% 100% 100% 100%
No	100% 100% 100% 100%
One Category	100% 100% 100% 100% 100% 100% 100% 100%

The differences in radioactivity between VLLW and HAW are determined in the amount of radiation given off from the waste and time it takes for the waste to decay. Higher Activity Wastes are at the highest end of the scale and give off the most radiation and take the longest to decay whilst giving off the most heat. Very Low Level Waste on the other hand: this waste is at the lowest end of the scale that is classed as radioactive and thus gives off the least radiation and generates no heat whilst decaying.

6. Do you believe a VLLW disposal site at Keele Head should be built?

Yes	100%
No	100% 100% 100% 100% 100% 100% 100% 100%

7. If yes / no, the reasons behind your choice? (multiple selections allowed)

Yes	
Bring jobs to West Cumbria	
Bring economic investment to West Cumbria	
May provide infrastructure improvements through community benefits packages	11
Increase the sustainability of the nuclear industry within West Cumbria	11
Can help to create a 'world class environment' for nuclear development in West Cumbria	11
No	
Absence of information relating to the project	11 11 11 1
Lack of trust in the decision making bodies	11 11 11
Poor prospect of finding suitable geology	
Do not want nuclear waste disposed in my back yard	
Health impacts related to radioactive waste	11 11

8. Are you aware of the reasoning behind the rejection by Cumbria County Council of the Keekle Head project?

Yes	11
No	11 11 11 11 11 11 11 11 11 11

The reason why Cumbria County Council rejected the Keekle Head planning application was because of the lack of need for such a facility as underlined by Low Level Waste Repository Ltd.

Thank you for taking the time to complete this survey.

Cumbria: conflicting attitudes to radioactive waste disposal with regard to Higher Activity Waste (HAW) and Very Low Level Waste (VLLW)

Location: Barrow-in-Furness town centre (outside the Nan Tait Centre, Market Street)

Good morning/afternoon/evening. My name is Peter Allan from the University of Central Lancashire (UCLan). I am carrying out an important piece of research on behalf of UCLan and Cumbria County Council. The research is about issues around possible future developments in the area.

The aim of the research is to determine public awareness of the Keekle Head and Managing Radioactive Waste Safely (MRWS) projects in relation to perspectives as to whether they should go ahead with reasoning behind your view.

The research follows the Market Research Society Code of Conduct and all your responses will be treated in the strictest confidence. The questionnaire lasts around 10 minutes.

1. Do you live in Cumbria?

Yes	<input checked="" type="checkbox"/>
No	<input type="checkbox"/>

2. In which District Council area do you live?

Allerdale	<input type="checkbox"/>
Barrow-in-Furness	<input checked="" type="checkbox"/>
Carlisle	<input type="checkbox"/>
Copeland	<input type="checkbox"/>
Eden	<input type="checkbox"/>
South Lakeland	<input type="checkbox"/>
Elsewhere	<input type="checkbox"/>

A few examples of Very Low Level Waste produced from the nuclear industry are: concrete, steel, glass, stone, pipes and pumps. This waste has the same radioactivity as the 'normal' level of the Earth's crust excluding areas where Radon is present, therefore is considered to be safe for disposing of in a landfill site with protective measures.

3. Are you aware of the planning application for a VLLW landfill disposal site at Keekle Head?

Yes	<input checked="" type="checkbox"/>
No	<input type="checkbox"/>

4. If yes, how much do you feel you know about the planning application at Keele Head?

I know a lot about it	
I know a fair amount about it	
I know just a little about it	
I have heard of this but know almost nothing about it	
I have never heard of it	

5. Are you aware of the differences in radioactivity levels between HLW and VLLW? Or would you classify all radioactive waste under one category?

Yes	
No	
One Category	

The differences in radioactivity between VLLW and HAW are determined in the amount of radiation given off from the waste and time it takes for the waste to decay. Higher Activity Wastes are at the highest end of the scale and give off the most radiation and take the longest to decay whilst giving off the most heat. Very Low Level Waste on the other hand: this waste is at the lowest end of the scale that is classed as radioactive and thus gives off the least radiation and generates no heat whilst decaying.

6. Do you believe a VLLW disposal site at Keele Head should be built?

Yes	
No	

Appendix G

Statistical analysis of hypotheses

Key:

Number of people who answered the option within the questionnaire and totals	
Chi Square for independence score	

Chi-square test for independence analysis

Hypothesis:	Null:	Alternative:
1	The proximity to the Keekle Head development and awareness of the project are independent.	The proximity to the Keekle Head development and awareness of the project are not independent.

Chi-Square Test: Yes, No (Table 20: Hypothesis 1 Chi-Square analysis)

Expected counts are printed below observed counts

Chi-Square contributions are printed below expected counts

Location:	Yes:	No:	Total:
Carlisle	22	45	67
	20.38	46.62	
	0.130	0.057	
Penrith	2	56	58
	17.64	40.36	
	13.865	6.059	
Kendal	1	42	43
	13.08	29.92	
	11.153	4.874	
Workington	34	43	77
	23.42	53.58	
	4.783	2.090	
Whitehaven	52	17	69
	20.98	48.02	
	45.846	20.035	
Barrow-in-Furness	0	51	51
	15.51	35.49	
	15.510	6.778	
Total:	11	254	365

Chi-Sq = 131.181, DF = 5, P-Value = 0.000

Hypotheses:	Null:	Alternative:
2	The proximity to nuclear sites in Cumbria and awareness of the differing levels of radioactivity are independent from one another.	The proximity to nuclear sites in Cumbria and awareness of the differing levels of radioactivity are not independent from one another.

Chi-Square Test: Yes, No, One Category (Table 21: Hypothesis 2 Chi-Square analysis)

Expected counts are printed below observed counts

Chi-Square contributions are printed below expected counts

Location:	Yes:	No:	One Category:	Total:
Carlisle	23	32	12	67
	13.95	13.58	39.47	
	5.870	24.969	19.114	
Penrith	12	34	12	58
	12.08	11.76	34.16	
	0.000	42.067	14.379	
Kendal	0	0	43	43
	8.95	8.72	25.33	
	8.953	8.718	12.329	
Workington	16	0	61	77
	16.03	15.61	45.36	
	0.000	15.611	5.396	
Whitehaven	15	3	51	69
	14.37	13.99	40.64	
	0.028	8.632	2.639	
Barrow-in-Furness	10	5	36	51
	10.62	10.34	30.04	
	0.036	2.758	1.182	
Total:	76	74	215	365

Chi-Sq = 172.682, DF = 10, P-Value = 0.000

Hypotheses:	Null:	Alternative:
3	The proximity to the Keekle Head nuclear development and acceptance of the development are independent.	The proximity to the Keekle Head nuclear development and acceptance of the development are not independent.

Chi-Square Test: Yes, No (Table 22: Hypothesis 3 Chi-Square analysis)

Expected counts are printed below observed counts

Chi-Square contributions are printed below expected counts

Location:	Yes:	No:	Total:
Carlisle	17	50	67
	13.22	53.78	
	1.083	0.266	
Penrith	12	46	58
	11.44	46.56	
	0.027	0.007	
Kendal	5	38	43
	8.48	34.52	
	1.430	0.351	
Workington	2	75	77
	15.19	61.81	
	11.452	2.814	
Whitehaven	1	68	69
	13.61	55.39	
	11.684	2.871	
Barrow-in-Furness	35	16	51
	10.06	40.94	
	61.826	15.193	
Total:	72	293	365

Chi-Sq = 109.006, DF = 5, P-Value = 0.000

Hypotheses:	Null:	Alternative:
4	The proximity to nuclear developments and the rejection reason due to NIMBY are independent.	The proximity to nuclear developments and the rejection reason due to NIMBY are not independent.

Chi-Square Test: Absence of i, Lack of trus, Poor prospec, Do not want , Health (Table 23: Hypothesis 4 Chi-Square analysis)

Expected counts are printed below observed counts

Chi-Square contributions are printed below expected counts

Location:	Absence of information relating to the project	Lack of trust in the decision making bodies	Poor prospect of finding suitable geology	Do not want nuclear waste disposed of in my back yard	Health impacts related to nuclear waste	Total:
Carlisle	36	14	0	0	0	50
	10.81	8.28	0.17	24.32	6.42	
	58.691	3.957	0.169	24.324	6.419	
Penrith	0	22	0	0	24	46
	9.95	7.61	0.16	22.38	5.91	
	9.946	27.175	0.155	22.378	55.443	
Kendal	16	12	0	0	10	38
	8.22	6.29	0.13	18.49	4.88	
	7.374	5.182	0.128	18.486	5.377	
Workington	0	0	0	75	2	77
	16.65	12.75	0.26	37.46	9.89	
	16.649	12.747	0.260	37.622	6.290	
Whitehaven	0	0	0	69	0	69
	14.92	11.42	0.23	35.57	8.86	
	14.919	11.422	0.233	37.401	8.858	
Barrow-in-Furness	12	1	1	0	2	16
	3.46	2.65	0.05	7.78	2.05	
	21.084	1.026	16.554	7.784	0.001	
Total:	64	49	1	144	38	296

Chi-Sq = 438.056, DF = 20

WARNING: 6 cells with expected counts less than 1. Chi-Square approximation probably invalid.

10 cells with expected counts less than 5.

Hypotheses:	Null:	Alternative:
5	The proximity to proposed nuclear developments and the awareness of the rejection of the Keekle Head developments are independent.	The proximity to proposed nuclear developments and the awareness of the rejection of the Keekle Head developments are not independent.

Chi-Square Test: Yes, No (Table 24: Hypothesis 5 Chi-Square analysis)

Expected counts are printed below observed counts

Chi-Square contributions are printed below expected counts

Location:	Yes:	No:	Total:
Carlisle	6	61	67
	7.53	59.47	
	0.309	0.039	
Penrith	0	58	58
	6.52	51.48	
	6.515	0.824	
Kendal	3	40	43
	4.83	38.17	
	0.693	0.088	
Workington	18	59	77
	8.65	68.35	
	10.109	1.279	
Whitehaven	14	55	69
	7.75	61.25	
	8.039	0.638	
Barrow-in-Furness	0	51	51
	5.73	45.27	
	5.279	0.725	
Total:	41	324	365

Chi-Sq = 31.988, DF = 5, P-Value = 0.000

1 cells with expected counts less than 5.

Appendix H

Ethics and risk assessments

Application for safety and ethical approval for all projects

School of Built and Natural Environment

All undergraduate, postgraduate, commercial and research projects need ethical approval. No field work, experimentation or work with participants can start until approval is granted. The questions below should be completed by the Principal Investigator or supervisor of the proposed project. Where projects involve students, the Principal Investigator is always the supervisor and never the student.

For **undergraduate** and **postgraduate taught** projects: use the questions to identify whether the project should be referred to the relevant Ethics Committee.

- If you answer “No” to questions, then do not apply for approval.
- If you answer “Yes” to **any** of the questions, please discuss them with your supervisor. If your supervisor is confident that you can follow standard forms, protocols or approaches, then your supervisor can approve your application. If your supervisor is not, then the application should be sent for approval.

For **research, commercial and other** projects: use the questions to help compile suitable evidence to support your application.

- If you answer “No” to questions, then your application is likely to be approved quickly.
- If you answer “Yes” to **any** of the questions, please provide evidence relating to the management of the activity. If your approach seems appropriate, then your application is likely to be approved quickly.

Submit the application form and any supporting evidence to an appropriate Ethics Committee. Different committees might have different approval processes.

Principal Investigators, or project supervisors, are responsible for ensuring that all activities fall within the principles set down in the University Code of Conduct for Research and the University Ethical Principles for Teaching, Research, Knowledge Transfer, Consultancy and Related Activities. They are also responsible for exercising appropriate professional judgment in undertaking this review and evaluating the activity according to the criteria laid down in this application. If you are uncertain about any sections of this document, or need further information and guidance, please consult a member of the relevant School Ethics Committee.

The School Ethics and Safety Committees are to ensure that you comply with the University’s ethical principles in the conduct of the activity. Committees can ask for clarification or set conditions for you to meet before approval is granted.

Expiry and review: The principal investigator is responsible for ensuring activities are reviewed. Normally:

- each year: review risk assessments: check for changes to hazards and training refreshers
- after 5 years: review ethics: check for new laws, practices
- closure: dispose of materials and sensitive data properly

Refer to the relevant documents from the following links:

1. Ethical Principles for Research, Consultancy, Practical Work and Related Activities
2. Research Governance (Multiple documents)
3. Health, Safety & Environment (Multiple documents)

1 Project synopsis

Approver:

Cmte number:

1.1 Title	"Cumbria: conflicting attitudes to radioactive waste disposal with regard to higher activity wastes and very low level waste"								
1.2 Project type	Original research		Research degree		PG taught		UG taught x	Commercial	
1.3 Short description in layman's terms [no acronyms or jargon]	This research will investigate the conflicting attitudes across Cumbria towards radioactive waste disposal with regards to higher and very low activity wastes. The case studies of the proposed Keekle Head Radioactive landfill and Geological Disposal Facility will be used to asses the conflicting attitudes.								
1.4 Dates	Start: May 2012				End: April 2013				
1.5 School of	Build and Natural Environment								

2 Participants

2.1 Project supervisor /principal investigator: name, position and original signature	Project Supervisor: Alison Robinson Principle Investigator: Peter Allan
2.2 Co-workers: names and positions [eg student]	Cumbria County Council

3 External collaborators

- 3.1 List external collaborating bodies
- 3.2 Provide evidence of any ethical approvals obtained [or needed] by external collaborators
- 3.3 Indicate whether confidentiality agreements have been or will be completed

Read any associated procedures and guidance or follow any associated checklist, and delete, Yes or No, for each characteristic in A) to F) below.

If you respond **No**, then in your judgment you believe that the characteristic is irrelevant to the activity.

If you respond **Yes**, then you should **provide relevant documentation** [including [risk assessments](#)] with the application, and cross-reference to it, eg A2 or B9. **Use reference numbers of standard** forms, protocols and approaches and risk assessments where they exist.

<p>A) Does the activity involve field work or travel to unfamiliar places? If Yes:</p> <ol style="list-style-type: none"> 1. Does the activity involve field work or leaving the campus [eg overseas]? 2. Does the field work involve a 'party' of participants or lone working? 3. Does the activity involve children visiting from schools? 	<p>A) Yes/ <input type="checkbox"/></p> <ol style="list-style-type: none"> 1. Yes/ <input type="checkbox"/> 2. Yes/ <input type="checkbox"/> 3. <input type="checkbox"/> No
<p>B) Does the activity involve humans other than the investigators? If Yes:</p> <ol style="list-style-type: none"> 1. Will the activity involve any external organisation for which separate and specific ethics clearance is required (e.g. NHS; school; any criminal justice agencies including the Police, CPS, Prison Service)? – start this now [CRB clearance process at Loughborough; Uclan contact Carole Knight] 2. Does the activity involve participants who are unable to give their informed consent (e.g. children, people with severe learning disabilities, unconscious patients etc.) or who may not be able to give valid consent (e.g. people experiencing mental health difficulties)? 3. Does the activity require participants to give informed consent? [consent guidance at City U] 4. Does the activity raise issues involving the potential abuse or misuse of power and authority which might compromise the validity of participants' consent (e.g. relationships of line management or training)? 5. Is there a potential risk arising from the project of physical, social, emotional or psychological harm to the researchers or participants? 6. Does the activity involve the researchers and/or participants in the potential disclosure of any information relating to illegal activities; the observation of illegal activities; or the possession, viewing or storage (whether in hard copy or electronic format) which may be illegal? 7. Will deception of the participant be necessary during the activity? 8. Does the activity (e.g. art) aim to shock or offend? 9. Will the activity involve invasion of privacy or access to confidential information about people without their permission? 10. Does the activity involve medical research with humans, clinical trials or use human tissue samples or body fluids? 11. Does the activity involve excavation and study of human remains? 	<p>B) Yes/ <input type="checkbox"/></p> <ol style="list-style-type: none"> 1. <input type="checkbox"/>/No 2. <input type="checkbox"/>/No 3. Yes/ <input type="checkbox"/> 4. <input type="checkbox"/>/No 5. <input type="checkbox"/>/No 6. <input type="checkbox"/>/No 7. <input type="checkbox"/>/No 8. <input type="checkbox"/>/No 9. <input type="checkbox"/>/No 10. <input type="checkbox"/>/No 11. <input type="checkbox"/>/No
<p>C) Does the activity involve animals and other forms of life? If Yes:</p> <ol style="list-style-type: none"> 1. Does the activity involve scientific procedures being applied to a vertebrate animal (other than humans) or an octopus? 2. Does the activity involve work with micro-organisms? 3. Does the activity involve genetic modification? 4. Does the activity involve collection of rare plants? 	<p>C) <input type="checkbox"/>/No</p> <ol style="list-style-type: none"> 1. <input type="checkbox"/>/No 2. <input type="checkbox"/>/No 3. <input type="checkbox"/>/No 4. <input type="checkbox"/>/No
<p>D) Does the activity involve data about human subjects? If Yes:</p> <ol style="list-style-type: none"> 1. After using the data protection compliance checklist, have you any data protection requirements? 2. After answering the data protection security processing questions, have you any security requirements? [Data storage] [keep raw data for 5 years] 	<p>D) Yes/ <input type="checkbox"/></p> <ol style="list-style-type: none"> 1. <input type="checkbox"/>/No 2. <input type="checkbox"/>/No

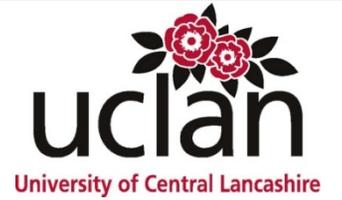
<p>E) Does the activity involve hazardous substances? If Yes:</p> <ol style="list-style-type: none"> 1. Does the activity involve substances injurious to human or animal health or to the environment? Substances must be disposed properly. 2. Does the activity involve igniting, exploding, heating or freezing substances? 	<p>E) <input type="checkbox"/>/No</p> <ol style="list-style-type: none"> 1. <input type="checkbox"/>/No 2. <input type="checkbox"/>/No
<p>F) Other activities:</p> <ol style="list-style-type: none"> 1. Does the activity relate to military equipment, weapons or the Defence Industry? 2. Are you aware of any ethical concerns about the company/ organisation, e.g. its product has a harmful effect on humans, animals or the environment; it has a record of supporting repressive regimes; does it have ethical practices for its workers and for the safe disposal of products? 	<p>F)</p> <ol style="list-style-type: none"> 1. <input type="checkbox"/>/No 2. Yes/<input type="checkbox"/>
<p>Note: in all cases funding should not be accepted from tobacco-related industries</p>	

If you respond **Yes**, then you should **provide relevant documentation** [including risk assessments] with the application, and cross-reference to it, eg A2 or B9. **Use reference numbers of standard forms, protocols and approaches and risk assessments where they exist.**

These standard forms are being followed [cross reference to the characteristic, eg A2]:

<p>A1 – See risk assessment</p>
<p>A2 – See risk assessment</p>
<p>B3 – Informed consent will be sought from all participants in accordance with the UCLan: Ethical principles for teaching, research consultancy, knowledge transfer and related activities.</p>
<p>The research will be undertaken in line with the requirements of the Data Protection Act 1998 and the Freedom of Information Act 2000.</p>
<p>D - The research will not rely on audio, video, photographic or any other recording medium and participants will not be identified from the responses they provide. Informed consent will be sought from all participants in accordance with the UCLan: Ethical principles for teaching, research consultancy, knowledge transfer and related activities.</p>
<p>The research will be undertaken in line with the requirements of the Data Protection Act 1998 and the Freedom of Information Act 2000.</p>
<p>F2 – Ethical concerns within the research relate to the impacts of nuclear waste on human health and the environment in relation to the waste disposal in the UK.</p>

Health, Safety and Environment Section



RISK ASSESSMENT FORM

Risk Assessment For
Service / Faculty / Dept: SBNE
Location of Activity: Carlisle, Penrith, Kendal, Workington, Whitehaven, Barrow – Cumbria.
Activity: Undertaking questionnaires and desk based research (Carlisle)
REF:

Assessment Undertaken By
Name: Peter Thomas Allan
Date: 20 th February 2012
Signed by Head of Dept / equivalent
Date

Assessment Reviewed
Name:
Date:

List significant hazards here:	List groups of people who are at risk:	List existing controls, or refer to safety procedures etc.	For risks, which are not adequately controlled, list the action needed.	Remaining level of risk: high, med or low
Lone Working	Student	<p>Avoid lone working where possible especially if it is an unfamiliar area.</p> <p>Always carry a fully charged mobile phone.</p> <p>Location information given to a friend / family member along with the estimated time of return.</p>		Low
Transportation: Car	Student	<p>Contact details for insurance and breakdown / recovery services.</p> <p>Always carry a fully charged mobile phone.</p>		Low
Personal Security	Student	<p>Mobile phone number and information given to a friend / family member as to the location of the interviews / research and an estimated time of return.</p>		Low
Violence and Aggression	Student	<p>Ensure all interviews are carried out in a safe environment.</p> <p>Make sure a working timetable is discussed and a fully charged mobile phone is carried at all times.</p>		Low

Repetitive Strain Injury	Student	<p>Regular breaks every 45 minutes will be taken when undertaking desk-based research.</p> <p>A chair with the appropriate levels of support, correct prescription glasses and correct visual display unit will be required to avoid repetitive strain injury.</p>		Low
Data Protection / Consent Issues	Participants	<p>The research will not rely on audio, video, photographic or any other recording medium and participants will not be identified from the responses they provide. Informed consent will be sought from all participants in accordance with the UCLan: Ethical principles for teaching, research consultancy, knowledge transfer and related activities.</p> <p>The research will be undertaken in line with the requirements of the Data Protection Act 1998 and the Freedom of Information Act 2000.</p>		Low