# Excavation

LESSON 2

## The Big Dig

ARCHAEOLOGY
time in transition

IT'S ABOUT TIME 2

BACK TO CONTENTS

**Aim(s)** To provide the students with an understanding of the process of archaeological excavation.

**Objective(s)** To give the student first-hand visual experience of the various stages involved in an archaeological excavation and to explain the various processes involved.

**Time Period** Neolithic to Present Day (4,000 BC to today).

## KEY INFORMATION

### Lesson

- Removal: the 'dig' part of the process.
- Recording: drawings; plans; photographs; forms; labels etc.
- Conservation: conserving and storing the 'finds.'
- Interpretation: making sense of what was found.

### Context

- Archaeological excavation is the removal, recording, conservation and interpretation of features and artefacts buried in the ground.
- Archaeological excavation is a systematic and ordered process from start to finish.
- Today in Ireland most archaeological excavations are carried out by commercial companies in advance of development projects like road schemes, housing estates, pipelines etc.
- These excavations are paid for by the developers and licensed by the Department of Arts, Heritage and the Gaeltacht (AHG).

## METHODOLOGY & MEDIUM

- Instruction
- Visual–PowerPoint
- **Worksheet** The Big Dig
- **Student Handout** The Big Dig–An Archaeological Excavation

## SECTIONS

**Section 1** Archaeological Excavation
**Section 2** Getting Ready
**Section 3** Let the Dig Begin
**Section 4** Recording
**Section 5** Excavations in Action
**Section 6** Taking Samples
**Section 7** Artefacts
**Section 8** Packing Up

Note: This lesson is based on a series of excavations carried out by a private archaeological company on contract to the National Roads Authority (NRA). The NRA contracted the company to test for any previously unknown archaeological monuments on the route of various new roads and motorways–the routes are selected to avoid all known archaeological monuments. Once discovered these archaeological features are then fully excavated.

**Key Question(s)** What happens on an archaeological excavation?

### Slide 1 The Big Dig

We will now look at the various stages involved in an archaeological excavation.

### Slide 2 Archaeological Excavation

**Definition:** *Archaeological Excavation is the systematic removal, recording, conservation and interpretation of features and artefacts buried in the ground.*

**Teacher Instruction**

Distribute **Worksheet 1** The Big Dig.

Establish what the students understand about an archaeological excavation by describing the scene. Write the key words on the board.

- Systematic: an ordered process from start to finish.
- Removal: the 'dig' part of the process.
- Recording: drawings, plans, photographs, forms, labels etc.
- Conservation: conserving and storing the 'finds'.
- Interpretation: making sense of what was found.

All archaeological excavations in the State have to be licensed by the Minister for Arts, Heritage & the Gaeltacht under the provisions of the National Monuments Act.

The best way to understand this process is to see it in action. The following slides are from a series of archaeological excavations carried out in advance of motorway construction. Private archaeological companies, who tender for the work on a competitive basis, conducted these excavations on behalf of the National Roads Authority (NRA). Some of the examples have come from the Case Study area (see ***Discovery: a Case Study***, T3,U1,L2).

### Slide 3 Discovery

In the planning of a new road or motorway the NRA avoid all known archaeological monuments. However, once a new route is decided upon, extensive testing is carried out to see if any previously unknown archaeological features lie in the way. This testing includes removing topsoil with a mechanical digger and observing any features that may be uncovered. Once discovered these archaeological features need to be fully excavated in advance of road construction.

- Along the line of a new motorway the topsoil is removed and monitored by archaeologists. Here we can see the archaeologist watching carefully as a digger scrapes off the topsoil. Areas of 'archaeological potential' have been marked with red and white tape. The archaeologist has seen darker soil in this area worthy of further investigation.
- It takes a trained eye to distinguish between archaeological features and natural colour changes in the subsoil. Features in the soil which look like archaeology are marked-off for excavation.

The machine uses a flat-blade bucket (i.e. with teeth removed) to leave a 'clean' surface with minimal disturbance of any archaeological features which may be present. Archaeological features might be the foundations of stone walls, traces of burning (hearth? furnace? kiln?), or patches of darker/lighter soil evident against the colour of the natural sub-soil.

**Key Question(s)** How does an archaeological excavation get under way?

### Slide 4 Cleaning back

Once a feature of 'archaeological potential' has been recognised the area is cordoned off until ready to be excavated. The first step in this process is 'cleaning-back'. Using hand trowels and hoes the archaeologists remove loose soil from the area to leave a clean 'fresh' surface.

- Cleaning back removes a thin layer of loose soil from the surface. This creates a clean surface which helps to define the extent of whatever archaeological features are present.
- In this picture the crouching archaeologists use trowels and the standing archaeologists are using hoes.
- The loose soil is gathered in the wheelbarrow and taken off site to a spoil heap.
- When the site is being cleaned back, everyone works in the same direction, forming a line at on end and working backwards.

### Slide 5 Site Survey

Once the area to be excavated is cleaned back, a surveyor sets up a site grid using a theodolite. During excavation all artefacts and features are plotted with reference to this grid.

- This shows a two-metre grid across the site.
- The intersecting points on the grid are marked by grid pegs (metal bars) for use later by the archaeologists as reference points.

The site grid is linked to the Irish National Grid to enable the exact position of the archaeological excavation to be plotted.

### Slide 6 Pre-excavation Drawing

A pre-excavation drawn plan of the area is now made, showing all recognised features. The plans are drawn using permatrace (special water-proof tracing paper) and a hard sharp pencil.

**Why is there need for waterproof paper?**

- Using a hard pencil (2H) and permatrace ensures that the plan survives even if it is drawn in the rain. The permatrace is laid over a hard board covered in graph paper.

A 1m² drawing frame is placed on the ground. This is a timber frame sub-divided into 20cm squares

- The yellow square on the drawing represents the yellow square on the drawing frame.
- A combination of the drawing frame and the graph paper means that it is possible to draw the plan to scale by eye.
- Drawings are made at a scales ranging from 1:10 to 1:100, depending on the size of the feature being drawn.
- Photographs will also be taken of the features at this stage.

In this slide you can see measuring tapes laid out along the line of the grid, between the grid pegs. The drawing frame is placed on the ground with respect to the measuring tapes so that the plan being drawn can be placed with respect to the overall site plan.

- Also in the photograph we see other archaeologists using hand trowels at various stages in the excavation process.
- In the background a machine is dumping topsoil stripped from the site onto a spoil-heap–managing topsoil is important in order to keep the excavation neat and tidy (remember the chocolate chip cookie in ***Excavation: What's it all about?*** T3,U2,L1).

**Key Question(s)** How is soil removed during the excavation?

## Slide 7 Context Numbers and Stratigraphy

### Context Numbers

- The basic procedure by which an excavation is conducted and recorded is that of using ***context numbers.***
- Every individual feature recognised after the 'cleaning-back' stage is given a unique context number (C1, C2, C3 etc.).
- Then as each of these 'contexts' is being excavated each one of its component features–as recognised by the archaeologist excavating it–is also given a unique context number.

These context numbers form the framework on which an excavation is recorded. It is the inter-relationship of all the contexts that forms the basis on which the excavation is understood.

For example

- A circular area of dark soil is recognised during cleaning-back as a possible post hole and given the context number C1.
- When it is being excavated the remains of the post is given the number C2 and the fill of the pit C3.
- When all the fill is removed the 'cut' for the post hole is given the context number C4.
- Thus C1 is the primary context, whilst C2, C3 & C4 are its associated contexts.

## Slide 8 Stratigraphy

Stratigraphy: the principle by which these contexts are related to each other is called ***stratigraphy***. This principle states that

- Materials deposited in the ground build up one on top of the other over time–the oldest at the bottom, the youngest on top (see ***Excavation: What's it all about?*** T3,U2,L1).
- Layers accumulate one on top of the other, like the sequence of rubbish in the wheelie bin.

However, stratigraphy is rarely as simple as this due to continued human activity over the centuries in one place. Thus the building of a burial monument in the Bronze Age may have disturbed the remains of a Neolithic house and subsequently the remains of both these features disturbed by the construction of an enclosure in the Early Christian period. This area was then subjected to continual agricultural activity (ploughing, building field boundaries and drains etc.) over hundreds of years. In this case the 21st century archaeologists excavating the site in advance of a new motorway, will find a very complicated stratigraphy to unravel. This is the task which context numbers are designed to solve.

### Slide 9 Digging Tools

- Archaeologists spend a lot of time on their hands and knees scraping back the soil with a trowel.
- A hoe can save a lot of backache when cleaning back an area.
- When digging out deep contexts a mattock or pick is sometimes used. Mattocks are also used where there is a large hard deposit to remove and particularly when it is not likely to contain any artefacts.

### Slide 10 Shovels!

- Archaeologists also use shovels to remove large volumes of soil in areas that are not archaeologically sensitive.
- However, in this slide, a trowel is used to check to see if they are coming down on any archaeological features.

### Slide 11 Context Numbers

- In this slide we see archaeologists excavating individual features, like post holes. Each feature identified during clearing back now has a context number. As the feature is being excavated new context numbers are given where appropriate.
- The tools in this slide include a trowel, which is being used in the foreground for close, careful excavation of a small context. Gardening mats are often used to sit or kneel on (a common complaint amongst diggers is sore knees–this is caused by kneeling for long periods on cold ground!).
- A large context, like the deep ditch to the right, would be excavated by a team of archaeologists.
- The spoil (loose soil) from this work is collected in buckets and then dumped into a nearby wheelbarrow. Other tools used include a mattock (a type of pick with a blunt end) and a shovel–in right foreground. The spoil is removed to a spoil heap close to the edge of the excavation using a wheelbarrow. However, in this instance, for convenience, it is being dumped into a previously excavated ditch.

**Key question(s)** How does the recording system on an excavation work?

## Slide 12 Meticulous Recording

Recording is an essential part of all archaeological excavations. Archaeological excavation is a destructive technique and therefore it must be an ordered and fully recorded process. Every context will be recorded by

- A written description.
- A *Context Record Sheet.*
- Plan and section drawn to scale.
- Photographs.

The recording system is based on the **context number**

- In addition to a feature having a context number, each archaeological entity recognised within the feature also gets a context number.
- Each layer within a ditch or each fill within a pit, is given a unique context number.
- For each **context number** the archaeologist who has just excavated it will immediately fill out a **Context Record Sheet**, write a written description of the context, make a scale drawing(s) of it, and make a photographic record of it.
- The drawings and the photographs are marked with the appropriate **context number.**
- In most average-sized excavations thousands of context numbers are used.
- Photographs are an essential part of the site record so a camera needs to be kept on site all the time. In the lower picture the archaeologist has just taken a photograph of the context he has just excavated. Can you see the camera in a plastic bag. Why? Conditions on site are not ideal and the camera needs to be protected from rain and dust.

## Slide 13 Context Record Sheets

- In this slide the archaeologist is recording a small post hole on a **Context Record Sheet.** The black colour of the fill in the pit was obviously different from the surrounding soil.
- All the relevant information about the post hole is recorded in the **Context Record Sheet** (type of soil; colour of soil; dimensions etc.)

What tools are being used by this archaeologist for excavation of this small pit?

- spoon,
- leaf trowel (a small trowel),
- measuring tape–vital tool on an excavation–why?

When a new context is found it is given a context number. Here the number has been written on a waterproof label and pined into the ground beside the context, using a nail.

In this photograph we see an archaeologist recording the section of a small pit. The tools and props used by the archaeologist include a kneeling mat, a bucket, a leaf trowel, a spoon, and a measuring tape.

### Slide 14 Drawing Plans

After the context is excavated, a post-excavation plan is drawn

- The archaeologist here is recording the slot foundation trench of a Neolithic house at Caherdrinney, Co. Cork.
- The drawing is being done on permatrace using a hard pencil.
- He is using a drawing frame to record the feature.
- This allows the planner to draw by eye rather than have to measure every feature on the ground.

Archaeologists continue to record and plan throughout the excavation. The excavation of the site is finished when all the archaeological deposits are removed and only the undisturbed natural subsoil remains.

### Slide 15 Measuring

Sometimes, different methods of drawing plans are used on site

- Here, instead of a drawing frame, measurements of some stake holes are being taken using a hand tape from a tape stretched between two grid pegs.
- Trigonometry is sometimes used to create right angles and to draw scale plans (remember Pythagoras' theorem) based on the site grid.

### Slide 16 Taking Levels

- Modern excavation techniques require that the precise location of all artefacts and features are recorded.
- Levels are taken across the archaeological excavation to record the elevation of the various archaeological contexts. The instrument used in this work is a *level*, as illustrated in the photo. The level reads horizontally across to a graduated meter rod. These readings help to record the vertical relationship between the various contexts.
- The levels are tied into the nearest benchmark so the entire excavation can be plotted against mean sea level (see ***Mapping the Past*** T3,U1,L1).

Now the archaeologist has both

- Horizontal location–plan
- Vertical position–level

of all the features and artefacts discovered by the excavation.

In the photograph several deep sections have been excavated through a ditch. These have to be cordoned off and marked using red and white hazard tape in the interests of *health and safety.* This site is a moated site at Busherstown, Co. Offaly where a 13th century silver penny was found.

**Key question(s)** What does an archaeological excavation look like?

### Slide 17 A Bronze Age House

- Here we see a Bronze Age roundhouse, at Ballynamona, Co. Cork, being excavated. The house survives as a circular slot trench.
- Post holes, pits and stake holes within the house can also be made out.
- The fence through the middle of this site (running vertically up through the middle of the photo) marks the edge of the road development.

Because only part of the house was found within the area of the development (to right) the site was extended beyond it (to left) in order to fully excavate the circular house.

**Teacher Instruction**
Ask the students to identify what the various archaeologists are doing.

### Slide 18 A 13th Century Moated Site

- In this photograph the archaeologists are excavating the fosse (ditch) of a **moated site.** This monument had been levelled some time in the past and no knowledge of its existence was known before the road scheme began.
- The dashed lines show the edges of the fosse.
- The archaeologists are excavating a section through the fosse in order to examine the sequence of layers that have built up in it over time (each layer getting a separate context number).
- The ladder shows how deep the feature is. The edges of the section have to be stepped for health and safety reasons.
- The tools used included buckets, wheelbarrows and shovels–this is heavy work with much soil to remove to the spoil heap.
- Nearby there are site huts, where the archaeologists store tools and records, and take their tea and lunch breaks.

**Teacher Instruction**
Ask the students what the excavation of a fosse like this will tell the archaeologist about the monument? How it was constructed; its function; what happened to it over time; its age–if datable material was found in the fill.

### Slide 19 Stratigraphy

Here is a photograph of the section through the fosse (ditch) of the moated site.

- The different colour and texture of the various 'layers' or 'fills' of the ditch show that it has a long and complex history.
- The bottom layer is composed of material deposited in the fosse shortly after it was cut.
- As the years go on more and more material gets deposited into the fosse–understanding the composition of these layers and how they accumulated over time is the task of the archaeologists excavating this feature.

### Slide 20 A Neolithic House

Here we see archaeologists excavating the remains of a rectangular house from the Early Neolithic period (4,000 - 3,600 BC). This was discovered in the townland of Caherdrinny, Co. Cork during work in advance of a new road. (See ***Discovery: A Case Study*** T3,U1,L2).

What remains of the house is a 'slot trench' which once held upright timbers forming the walls of the house (see ***No Place Like Home*** T2,U1,L1).

**Teacher Instruction**

Discuss with the students what the archaeologists are doing in the picture

- Two work with trowels, emptying soil out from the slot trench.
- Two measure and record the slot trench.
- A fifth draws the trench with the aid of a drawing frame (a 1m$^2$ timber frame sub-divided into 20cm squares).

**Teacher Instruction**

Ask the students to name the tools being used

- Buckets and wheelbarrows for removing spoil.
- Kneeling mats to protect knees.
- String.
- Measuring tapes.
- *Context Record Sheets.*

**Note:** on top of the hill on the horizon, to the right, stand the ruin of a 16th century tower house–Caherdrinny Castle. This is located in the centre of a large prehistoric hillfort (enclosing the top of the hill–not visible in photograph). The wooden fence line in the background marks the edge of the road catchment.

## SECTION 6 Taking Samples

**Key Question(s)** What samples are taken during an excavation?

### Slide 21 Soil Samples

(Back to the excavation techniques)

- Not everything of value is visible to the human eye. For this reason soil samples are taken during an archaeological excavation.
- These are stored in plastic bags. Each sample is assigned a separate sample number and is cross-referenced to the context number. They are analysed later in the hope of recovering seeds, very small bones etc.
- Some of this processing is done on-site but most of it will be carried out later in a laboratory.

- In this slide we see archaeologists taking soil samples from two pits inside a Bronze Age house.
- The bags are labelled on the outside and a waterproof label, written on permatrace, is inserted into the bags to ensure that the archaeologists know exactly what part of the site they are taken from.

### Slide 22 Recording Soil Samples

On the right in the photograph is a sealed plastic bag containing soil from a pit

- Information about the sample is written on the bag in permanent ink.
- A label with this information is placed within the bag.

On the right in the photograph is a **Soil Sample Record Sheet.** All this information is necessary if the material recovered from the sample is to be fully utilised by the archaeologist writing up the report on the excavation.

### Slide 23 Ballynacarriga

Some excavations produce lots of soil samples. These samples are from *Ballynacarriga 3* in Co. Cork (can you read the names on the bags?). This site is within the Study Area (***Discovery: A Case Study*** T3,U1,L2). It is a prehistoric settlement and burial monument.

**Why take so many soil samples?** To see what happens to soil samples in the post-excavation process (see ***Post-X–The next step*** T3,U3,L2).

### Slide 24 Dry Sieving

The slide shows the **dry sieving** of soil from an excavation.

- Dry sieving is sometimes used to check for artefacts in deposits where the material has been excavated using a shovel or mattock.
- This is a very labour-intensive job and only used occasionally.

## SECTION 7 Artefacts

**Key Question(s)** How do artefacts add to the picture?

### Artefacts

So far we have seen that most of the activity on our excavations concern the digging and recording of features and layers in the soil. Another aspect of excavation is the 'finds' that are discovered during this process. Artefacts are interesting and exciting objects to find on an excavation because

- They are often interesting objects in their own right.
- Can tell us a lot about the past (***Artefacts of Living*** T2,U4,L2).
- Can date the layers they occur in.

Some excavations, particularly those in historic towns and water-logged sites, can produce a lot of finds (see ***Beneath the Streets,*** T2,U3,L2). Most of the time the artefacts found are things like animal bones and fragments of broken pottery (sherds). However, occasionally something more unique is found.

### Slide 25 A Bronze Age Burial

This slide shows two archaeologists excavating an Urn Burial in the townland of Ballinacarriga, Co. Cork. This was discovered during the monitoring of topsoil removal (slide 3).

- The burial is contained in a small pit.
- In the pit an earthenware urn (an *Encrusted Urn of the Vase Tradition*) was inverted over the remains of a cremated human.

### Slide 26 Removal of Urn

This shows the sequence by which the pot was removed from the ground.

- It was discovered broken–its top is broken.
- A conservator then carefully reconstructed the pot so that it would not break any further when removed.
- The pot is now ready for lifting.

### Slide 27 Cremated Bone

Here is the cremated bone close-up

- Because the temperature of the cremation pyre was not very high the bone has not been reduced to ashes. Instead we can still make out individual pieces of bone–though now very brittle and whitened by the fire.
- Here we see the bone being very carefully removed from the pit. These bone fragments will eventually be sent to an expert in human remains and a report on them sent back to the archaeologist responsible for the excavation. This information will be included in the excavation report (see ***Excavation: What's it All About?*** T3,U2,L1).

### Slide 28 Urn Burial–what have we learned?

Excavation of Urn Burial: what did the archaeologists learn?

- Cremated burial.
- Remains placed in a pit.
- Cremated bone placed in a neat bundle in pit.
- Earthenware urn inverted over bone.
- No surface indication of burial.
- Bronze Age in date.

**Teacher Instruction**

Here is a reconstruction of the burial scene. Ask the students to describe what is happening. Body being cremated; pit dug; grave goods–pots, arrowheads, beads.

### Slide 29 Silver Penny

This slide shows a silver penny of Edward 1st, minted around 1290 in London (can you make out the letters CIVITAS LONDON (The City of London) on the coin? This coin was minted in London on licence from King Edward I. It was found during the excavation of the *moated site* at Busherstown, Co Offaly. The coin must have been lost by somebody living in the *moated site* and therefore gives us an idea of when it was occupied, and by whom.

What does this artefact tell us?

- The site was occupied around 1290 AD.
- The people who lived here used coins–they had a monetary system.
- There was trading contact with London–these people were part of the Norman trading system.

### Slide 30 Flint

Not all artefacts are as easy to date as a silver penny!

- Here archaeologists are examining a small piece of flint found during an excavation. Is this a naturally cracked pebble of flint or a man-made tool?

### Slide 31 Cutting Edge

Note the edge of the tool, opposite the thumb, has been sharpened to a cutting edge by chipping along the edge.

- This is known as *retouching* and shows that this is a man-made tool.
- Before the discovery of metal, flint tools like this were the sharpest implements available to man.
- These artefacts are often referred to as 'thumb scrapers'–can you see why? Held with the thumb and forefinger.

## SECTION 8 Packing Up

**Key Question(s)** When is an excavation finished?

### Slide 32 Checking Paperwork

- Back at the excavation, there is much work to do in keeping up with all the records: here we see an archaeologist (on the left) checking paperwork.
- The other archaeologist is annotating drawings.
- An excavation creates a lot of paperwork but all this is only useful if it is properly written up, labelled and stored.
- Eventually most of the information on the forms and the many drawings will all be transferred to digital form using database and drawing software.

### Slide 33 Storing Artefacts

It is also very important to ensure that all the artefacts found during the excavation are properly labelled and stored

- Here the archaeologist is making sure all the correct information is written on each plastic bag containing an artefact before they are packed off to storage or sent to the conservation lab.

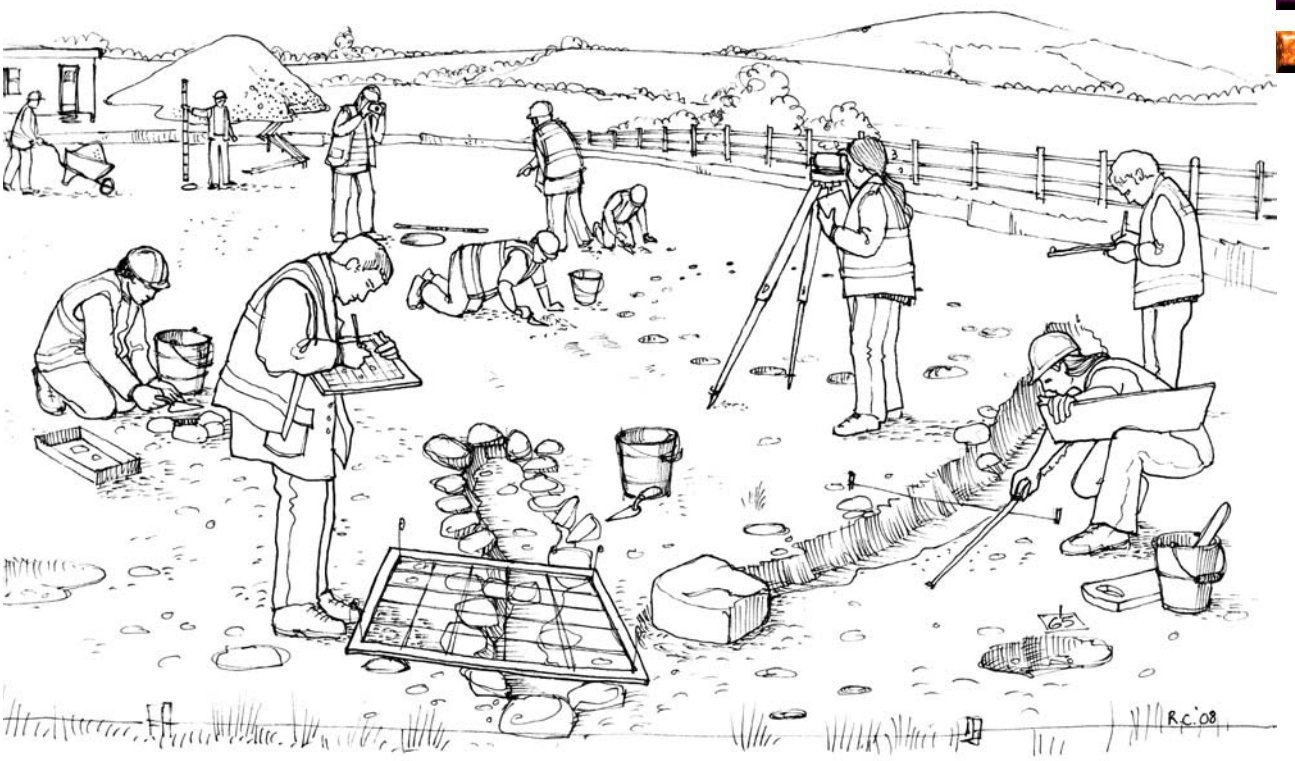
### Slide 34 Packing Up

And finally, the dig is over, the site is fully excavated. But this is only half-way in the story of the excavation. There is still much work to be done! (see ***Post X–The Next Step*** T3,U3,L2).

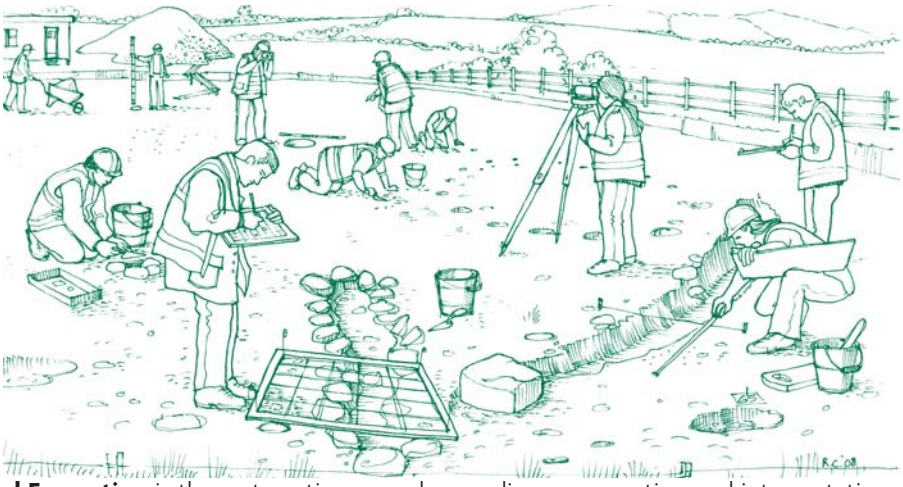
*See Projects section: Explore how Excavation adds to our Knowledge of the Past.*

## WEB LINKS www.

| | |
|---|---|
| Database of Irish Excavation Reports | **www.excavations.ie/Pages/HomePage.php** |
| Excavations and Techniques | **www.bbc.co.uk/history/archaeology/excavations_techniques/** |
| National Roads Authority–Archaeological Discoveries | **www.nra.ie/Archaeology/BrochureandPosterSeries/** |
| Archaeology–Downloadable Documents | **www.nra.ie/Archaeology/DownloadableDocuments/** |
| Excavation at Merrywell | **www.m3motorway.ie/Archaeology/Section1/Merrywell1/** |



**Describe the scene**



**Archaeological Excavation** is the systematic removal, recording, conservation and interpretation of features and artefacts buried on the ground.

- Systematic: an ordered process from start to finish.
- Removal: the 'dig' part of the process.
- Detailed Recording: drawings, photographs, forms, etc.
- Conservation: conserving and storing the 'finds.'
- Interpretation: making sense of what was found during and at Post Excavation stage.
- Dissemination of information: final report with all the findings.

**Cleaning-back and preparing a plan**

- Using hand trowels and hoes the archaeologists remove loose soil from the area to leave a clean 'fresh' surface.
- Cleaning back removes a thin layer of loose soil from the surface. This creates a clean surface and helps to define the extent of whatever archaeological features are present.
- The loose soil is gathered in the buckets and wheelbarrow and taken off site to a spoil heap.
- The site plan is carefully drawn identifying all exposed features.

**Excavation**

- All archaeological feature given a context number.
- The features are systematically dug out and recorded, each separate element given a new context number.
- The careful eye of a trained archaeologist is needed for this meticulous work.

**Recording**

Recording is an essential part of all archaeological excavations. Archaeological excavation is a destructive technique and therefore it must be systematic and everything must be fully recorded. Every context will be recorded by

- *A written description.*
- *A **Context Record Sheet.***
- *Plan and section drawn to scale.*
- *Photographs.*

**Post excavation**

All the information gathered on the excavation is taken back to the office to be processed. This involves

- Describing all the features and artefacts.
- Analysing and interpreting the finds.
- Preparing and analysing all the drawings and photographs.
- Studying soil samples and artefacts.
- Specialist reports–pottery, seeds, bones, textiles, etc.
- Producing a final report with all the findings.

Brief description of all excavations is available at **www.excavations.ie**