GREEN GEN CYMRU

An Overview of GGC Surveys

July 2026

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FOR WALES

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Contents

Introduction

This document has been prepared as an informative guide to provide landowners with an overview of the different non-intrusive survey types that will be carried out to inform Green Gen Cymru's projects.

Please note that this document provides a high-level overview of the likely planned surveys, setting out 'the purpose of the survey, why it is required', and a brief 'description of the methods involved' in collecting the relevant data. Should you require further information on any specific surveys outlined in this document, please contact a member of the team, who will be happy to provide the relevant details.

The descriptions of the surveys are non-technical in nature and the surveys undertaken may vary from the outline given in this document. Unless stated otherwise, the persons carrying out the survey will be on the land between the hours of 07:00 and 19:00.

Ecology Surveys

Phase 1 Habitat Surveys

What is it & why?

Habitat surveys are undertaken to identify the different types of habitats present on a site. Habitats are generally classified using JNCC Phase 1 or UK Habitat classification. Ecologists also use these visits to identify the likelihood that protected or notable species might be using the site. The results of a Phase 1 habitat survey are used to map habitats and help determine what additional surveys may be required.

How is it carried out?

Ecological surveyors will walk over the site and visually inspect it, recording the types of habitats and species that are present and their location using software designed for field survey data collection and taking photos of noteworthy features with cameras. Using this information, the ecologist will confirm if there are habitats or species of ecological interest at the site and recommend which type of additional surveys need to take place. The Phase 1 habitat survey can be undertaken at any time of the year.

National Vegetation Classification – Botanical Survey

What is it & why?

A National Vegetation Classification (NVC) survey is a detailed survey of plants in any botanically interesting habitats present at a site. These areas are identified either through desk study or from the phase 1 habitat survey. It is important for identifying plant

communities and fungi, as well as specific habitat types.

How is it carried out?

Ecological surveyors will use square frames (known as quadrats), which are placed randomly around a site, and the different species of plant inside each quadrat are identified, counted and measured to establish their frequency, density and percentage cover. This allows for detailed classification of habitats using the NVC framework. This survey can be completed between April and October.

Bat Surveys

What is it & why?

There are various survey methods used to determine if bats are present. The most common of these expected to be used on GGC projects are set out below, including static recorder surveys, activity transects, ground level tree assessments, preliminary bat roost assessment, tree climbing inspections and emergence surveys. These surveys are used to determine what species of bats are present in the environment, and whether they are roosting in a tree, building or structure.

Bats are protected by UK law under the Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended).

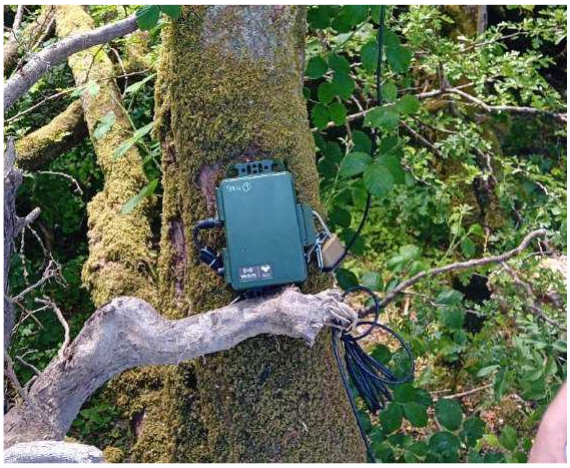
Static Recorder Surveys and Activity Transects

How is it carried out?

Bat static recorders are set up in areas thought to be suitable for bats. They are left out for a minimum of five nights either monthly between April and October, or in each "season" of spring (April/May), summer (June/July/August) and autumn (September/October). They generally start recording 30 minutes before sunset and stop 30 minutes after sunrise capturing echolocations (the high frequency sounds bats produce). They are generally set to record any frequency of 16 kilohertz (kHz) and above and do not record human speech (human speech is generally 0.1-4kHz). The recordings allow us to determine if bats are using a certain area, as well as identify what species of bats are present (as different species have different frequencies and call parameters).

Bat statics usually look like green boxes as shown below. They are fixed to trees/posts in areas thought to be suitable for bats, positioned at least 1 metre above ground level with a chain to hold them in place. Ecological surveyors will visit the site twice, around a week or two apart, first to deploy the equipment, and again to collect them.

Activity transects are normally carried out monthly or seasonally between April and October. Ecological surveyors will attend site and walk a route which passes through or near suitable habitat for bats. Bat detectors will be carried to record ultrasonic bat calls and play it back in a sound humans can hear, allowing surveyors to identify species. Transects either start before sunset and continue for 2-3 hours after sunset or start 2 hours prior to sunrise and stop approximately 30 minutes after sunrise.



Typical Bat Static Deployment Set Up

Bat Ground Level Tree Assessment

How is it carried out?

A ground level tree assessment (GLTA) involves an inspection of the tree from the ground, using visual methods to look for features within trees that could provide opportunities for bats to roost. GLTA are not seasonally constrained and can be undertaken during any time of the year.

Preliminary Bat Roost Assessment

How is it carried out?

A preliminary bat roost Assessment (PBRA) involves an inspection of a building or structure (e.g. bridge, tunnel, cave, cliff), using visual methods to look for features that could provide opportunities for bats to roost. For buildings, internal inspections may be completed where agreed. PBRA are not seasonally constrained and can be undertaken during any time of the year.

Tree Climbing Inspections for Bats

How is it carried out?

Tree climbing surveys (sometimes known as aerial inspection surveys) are to confirm if a tree is being used by bats and if so, by what species of bat. Surveyors will look for evidence of bats being present, such as droppings or the bats themselves. Surveyors will

also evaluate the condition of potential roost features. The main objective is to confirm presence or likely absence of bats.

The inspections are carried out by licensed ecologists who will use ladders, harnesses, ropes and associated climbing equipment to climb the tree in a safe manner. Torches and endoscopes (long, flexible or rigid telescopic poles or cables with a camera) are used to inspect potential roost features. Tree tags may be used to ensure the ecologists can keep track of and record the trees that might need an aerial inspection over time.

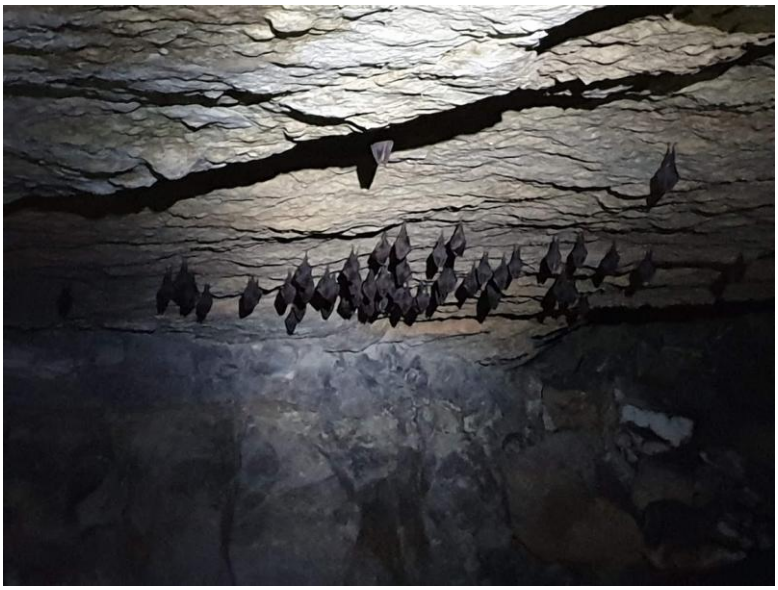
Trees are generally climbed between March and October.

Emergence and Re-entry Bat Surveys

How is it carried out?

Bats roost in trees, buildings and natural features such as cliffs and caves. Emergence and re-entry surveys are used to confirm if bats are present, and if so, determine species, and type of roost.

An emergence survey typically begins 15 to 30 minutes prior to sunset and continues for at least 1 hour and 30 minutes after sunset. A re-entry survey typically begins 2 hours before sunrise and continues until 30 minutes after sunrise. A team of two or more surveyors will position themselves around the tree or structure being surveyed. Surveyors will normally be equipped with a bat detector each and may use a camera capable of recording at night. Emergence and re-entry surveys generally take place between May and September.



Example of a cave with bats roosting in it
(Photo taken by a licensed bat ecologist)

Bird Surveys

What is it & why?

There are various methods used to understand what bird species are present and how they use a site through the year.

Birds are protected by UK law under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended).

How is it carried out?

Ecological surveyors specialising in birds, known as ornithologists, will make visual inspections, either using a walked transect or from key locations called vantage points, often at the top of a hill, which overlook a large area. They may use telescopes, binoculars, tripods and cameras to record information on the bird species, flight patterns and behaviours of birds that cross the site.

There are different phases of bird surveys. Breeding bird surveys are used to understand bird populations and breeding activity in a particular area. They are done during spring and summer months and surveyors must return to survey the same location up to six times in that period to ensure that enough data is collected. These surveys may start up to 2 hours before sunrise and continue into the morning or start before sunset and continue for up to three hours after sunset.

Wintering bird surveys are used to understand migratory and winter bird populations and their feeding, foraging and roosting behaviours in a particular area. They are done during winter months and surveyors must return to the same location at least four times in that period. These surveys generally take place during daylight hours but may include surveys around sunrise and sunset.

Vantage point surveys may require surveys each month for up to 12 months from the same location. These surveys generally take place during daylight hours but may include surveys around sunrise and sunset.

Badger Survey

What is it & why?

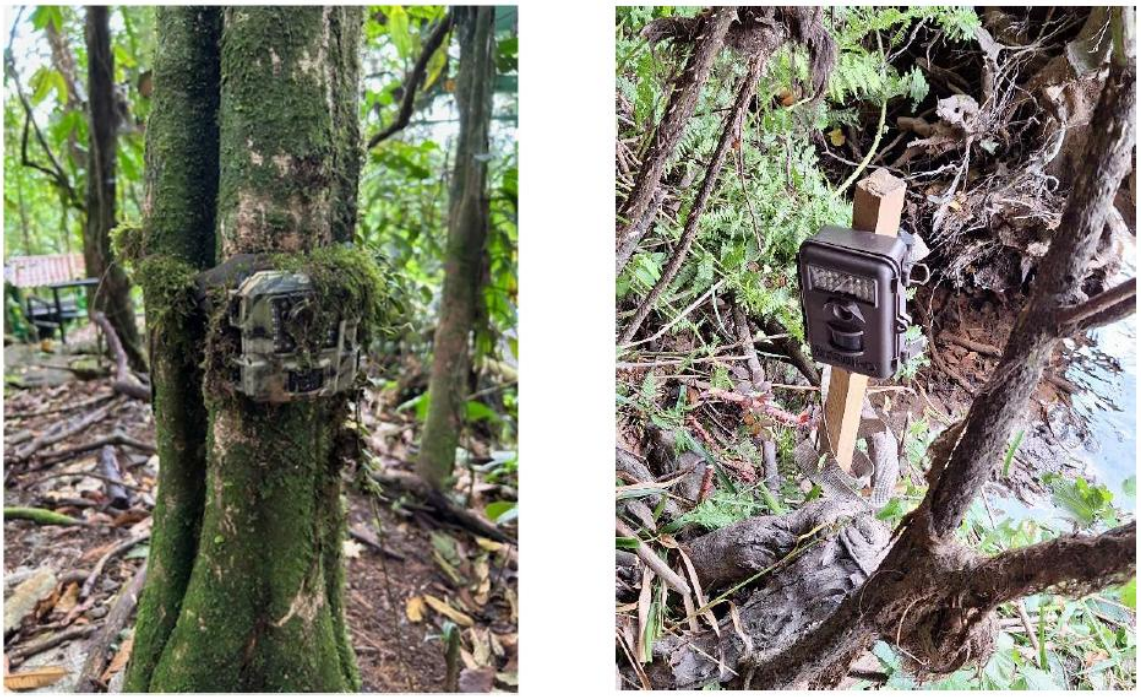
A badger survey is completed to identify whether suitable habitat is present for sett (den) building by the badgers and if there are signs of badger activity within the site boundary or nearby. This information is used to understand whether there is a risk of disturbance or damage to badgers or their setts.

Badgers are protected by UK law under the Protection of Badgers Act 1992.

How is it carried out?

Ecological surveyors will complete a visual search for setts and other signs of badger activity, including traces of hairs, footprints and bedding. Other signs include dung pits (known as latrines), foraging signs and mammal paths. Where setts are identified by an ecologist during their walkover, pictures will be taken and notes will be made on the number of entrances into the sett, signs of use, the size of the sett and whether it is active or not.

In some cases, it may be necessary to monitor a sett or area to determine badger activity and help classify the sett type. This is normally accomplished by deploying trail cameras. Trail cameras are small boxes containing a camera, the camera is triggered by movement across an infra-red sensor, at which point they take a picture or record a short video. Cameras would be positioned facing a sett or other area of interest and left in place for up to two months. Three visits would normally be required where trail cameras are deployed; one to deploy, a mid-deployment check of batteries and functional status, and collection.



Typical set up of a trail camera.

Riparian Mammal Survey

What is it & why?

A riparian mammal survey is to assess habitat suitability and look for evidence of otter, water vole and beaver.

These species are protected by UK law under the Wildlife and Countryside Act 1981 (as amended), and for otter and beaver the Conservation of Habitats and Species Regulations 2017 (as amended).

How is it carried out?

Ecological surveyors will look for clues such as footprints, burrows, dams (for beavers) food remains and faeces to work out whether aquatic mammals may be present. The surveyors will also look at the vegetation and habitats in the water and on the banks (riparian habitats), and adjacent habitats. Otter surveys in particular may extend away from watercourses. Surveyors will use binoculars, cameras and digital tablets to record data. Surveyors may enter a watercourse for this survey, and water samples may be taken for analysis.

The walkover for otters and beaver can be completed at any time of year, whilst for water voles this is generally undertaken between April and September.

In some cases, it may be necessary to monitor an area to determine activity. This is normally accomplished by deploying trail cameras. Trail cameras are small boxes containing a camera, the camera is triggered by movement across an infra-red sensor, at which point they take a picture or record a short video. Cameras would be positioned facing the area of interest and left in place for up to two months.

Additionally, for water vole latrine rafts may be deployed. These are rafts which are deployed in watercourses or ponds (attached to the banks). These act as artificial feeding platforms or latrines, which water voles will explore and use, leaving behind evidence such as droppings and food remains. They are particularly effective in areas where vegetation is too dense for surveyors to carry out visual inspections of the bankside.

Three visits would normally be required where trail cameras or latrine rafts are deployed, over a two-month period; one to deploy, a mid-deployment check of batteries and functional status, and collection. More than one deployment, or an extended deployment, may be required in some instances.

Dormouse Survey

What is it and why?

A dormouse survey looks for signs that dormice are present in an area. Surveys focus on habitats that dormice are known to use, such as woodland, hedgerows and scrub. The results help us understand whether a project could affect dormice or the places they live.

Dormice are protected by UK law under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended).

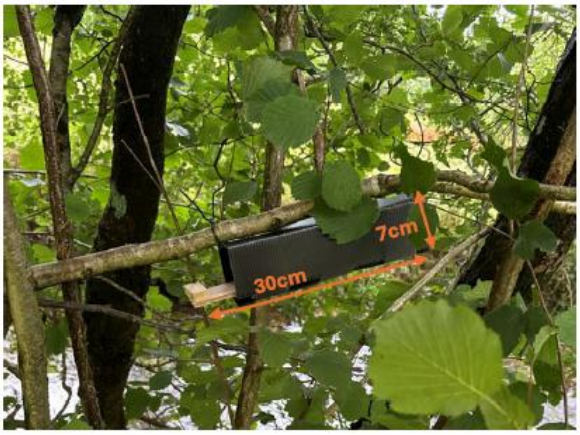
How is it carried out?

There are a few different methods for surveying dormice.

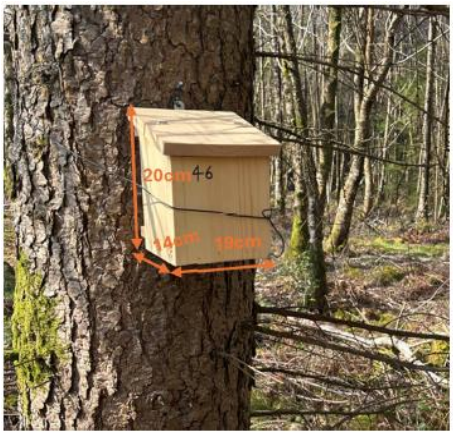
One common method is to install nest tubes or nest boxes in suitable habitat. These are attached to trees or branches and provide a safe place for dormice to build nests.

Surveyors check the tubes or boxes once a month to look for signs of dormice, such as nests or the animals themselves. Nearby trees are marked with temporary tape so the equipment can be found easily. All equipment and tape are removed when the survey is finished.

Nest tube and nest box surveys can be carried out between April and November, although most survey work takes place between May and October. Depending on the quality of the habitat present, the equipment is usually left in place for between four and eight months.



Typical deployment of a nest tube.



Typical deployment of a nest box.

Another survey method uses footprint tunnels. These are plastic tubes attached to branches. Inside each tunnel is a card with an ink pad at either end.

When an animal walks through the tunnel, it leaves footprints on the card. Dormouse footprints can be distinguished from those of other small mammals by the shape of their footpads. The ink is animal-friendly and non-toxic, typically made from charcoal and vegetable oil.

Footprint tunnels are usually left in place for three to four months and checked twice each month.

The final method likely to be used on this project is a nut search. This generally takes place between September and February and involves searching the ground beneath hazel trees for hazel nuts that have been opened by a small mammal. Different animals leave distinctive marks when opening hazelnuts, to reach the nut inside. By examining these marks, surveyors can sometimes confirm the presence of dormice. This generally

takes one visit but is not appropriate for all sites due to the requirement for large volumes of fruiting hazel.

Red Squirrel and Pine Marten Survey

What is it and why?

A red squirrel and /or pine marten survey is to assess habitat suitability and look for evidence of these species. Surveys focus on habitats that they are known to use, typically.

These species are protected by UK law under the Wildlife and Countryside Act 1981 (as amended), and for pine marten the Conservation of Habitats and Species Regulations 2017 (as amended).

How is it carried out?

Ecological surveyors will look for clues such as dreys (squirrel nests) food remains and faeces to work out whether these species may be present. The surveyors will also look at the vegetation and habitats to determine suitability. Surveyors will use binoculars, cameras and digital tablets to record data. Samples may be taken for DNA analysis.

The walkover can be completed at any time of year and usually only requires a single visit. Pine Marten are generally most active between May and September.

In some instances, follow up surveys may be required to confirm presence of either species. This could include deployment of trail cameras or hair tubes.

Hair traps are normally either plastic tubes or boxes with double sided sticky tape inside. They are installed on branches or trees and bait, such as peanuts or sunflower seeds, are placed inside. As a squirrel or pine marten puts their arm inside to gather the food, the sticky tape catches animal hair which can be sent for DNA analysis. This does not harm the animal or cause pain.

Trail cameras may also be deployed, either independently or in conjunction with hair traps. Trail cameras are small boxes containing a camera, the camera is triggered by movement across an infra-red sensor, at which point they take a picture or record a short video.

Four visits would normally be required where trail cameras or hair traps are deployed, over a two-month period; one to deploy, up to two mid-deployment check of batteries and re-stock food, and collection. More than one deployment, or an extended deployment, may be required in some instances.

Reptile Survey

What is it & why?

A reptile survey is where surveyors look for the presence of native reptiles, which include adder, grass snake, smooth snake, slow worm and common lizard and sand lizard.

All native reptiles are protected under the Wildlife and Countryside Act 1981 (as amended), Sand lizards and smooth snakes are also protected under the Conservation of Habitats and Species Regulations 2017 (as amended).

How is it carried out?

Where suitable habitat for reptiles has been identified, such as grassland, heathland and scrub, an ecologist will make an initial visit to the site and install artificial shelters (refugia) such as felt or corrugated metal mats laid out in suitable habitats in sunny areas. They create warm places that are attractive to reptiles wanting to bask in warm weather.

They are left for several weeks and monitored regularly for reptile activity. Ecologists will visit the site up to 8 times, first to lay out the mats, and the rest to check for activity by looking under the mats and visually checking for basking reptiles. Checks are ideally done in sunny conditions and must be completed between the months of April and October.

Great Crested Newt Surveys

What is it & why?

There are two primary survey methods used to determine if great crested newts are present, environmental DNA sampling and “traditional” survey methods, both described below. Both target water bodies during the amphibian breeding season of February to June.

Great crested newts are protected by UK law under the Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended).

Habitat Suitability Index

How is it carried out?

The Habitat Suitability Index (HSI) survey is a visual inspection of a pond or waterbody. It involves ecological surveyors surveying the pond, and evaluating factors like water quality, pond size and vegetation cover. This is used to determine the likelihood for great crested newts to breed in a pond. It requires a single site visit in daylight hours.

Environmental DNA Survey

How is it carried out?

Fresh water ponds and their surrounding vegetation (grassland and woodland) can

provide habitats for great crested newts. As they are active during the night (nocturnal) and live within ponds, they can be hard to spot. Therefore, a method is used of testing the water for genetic material specific to great crested newts, such as skin cells or mucus, to determine whether great crested newts have recently been in the pond, this method is known as Environmental DNA (eDNA).

Ecological surveyors will collect 20 small samples of water from around the pond using a tube on the end of a stick, which are then mixed in a bag and divided into 6 test tubes. These tubes are sent to a laboratory where they are tested for the DNA of great crested newts. Less than 1 litre of water is collected, and approximately 300ml is sent for analysis, with remainder returned to the pond. Strict biosecurity measures are followed.

These surveys can only be completed from 15th April to 30th June, when great crested newts are breeding in the water. It requires a single site visit in daylight hours.

Traditional survey methods including bottle traps

How is it carried out?

In some cases, where the number of newts needs to be known or eDNA cannot be relied on, traditional survey methods will be used to count newts.

Bottle traps are normally deployed. These are typically made out of 2litre plastic bottles cut in half with the top placed upside down into the bottom half, ensuring sufficient air is provided. They are positioned in the pond, sometimes attached to bamboo canes, in the evening by licensed ecological surveyors. If any newts are present, they will swim into the traps during the night and won't be able to get out. The following morning, ecologists will check if there are any newts in the traps. They will record the data and then release the newts. No animals are harmed.

During the deployment of traps surveyors will also look for eggs in vegetation, use torches to see into the pond once dark, and may use a net.

Survey can take place from February to June, with up to six visits. Each visit where bottle traps are used comprises an evening session (normally 2 hours prior to sunset to 2 hours after sunset) to deploy the traps and undertake a torch survey, followed by a morning session to collect in the traps (normally by 10am).

Aquatic Walkover Survey

What is it & why?

An Aquatic Walkover survey maps morphological and environmental variables of a watercourse or waterbody to determine its overall condition and likelihood of supporting protected or notable fish or other aquatic species.

Some fish and aquatic invertebrates are protected by UK law under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended).

How is it carried out?

Ecological surveyors will conduct a visual inspection to map environmental variables of a watercourse or waterbody, considering the states of the banks, open water and bottom substrates. They may enter the water to take samples or use a net to look for aquatic insects and small fish.

Surveys are generally timed to avoid periods of drought or high water and flooding.

Invertebrate Surveys- Marsh Fritillary

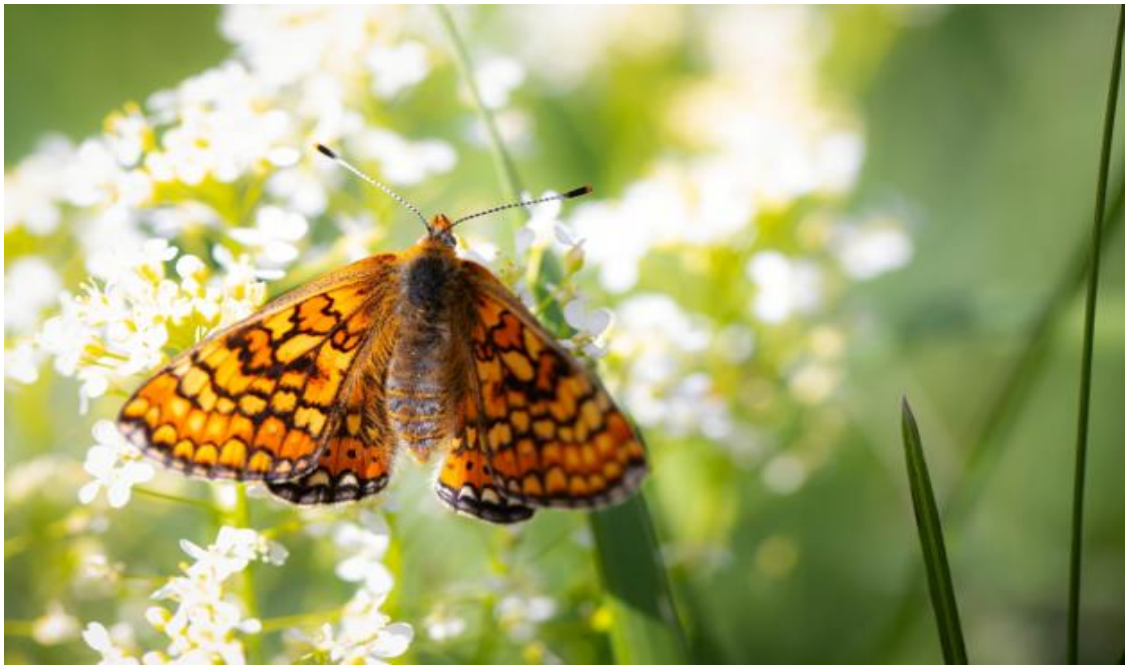
What is it & why?

This is a non-intrusive walkover survey where ecological surveyors look for the presence of habitats and features that may be of value for invertebrates, including the Marsh Fritillary butterfly.

Marsh Fritillary are protected by UK law under the Wildlife and Countryside Act 1981 (as amended).

How is it carried out?

Surveys generally take place between July and September and up to two visits may be required. The survey is conducted through visual inspections to identify adult Marsh Fritillary or larval webs. The number and locations of adults or larval webs are recorded.



Marsh Fritillary

White Clawed Crayfish Survey

What is it & why?

White clawed crayfish are the UK's only native freshwater crayfish, and are identified as an endangered species, facing significant threats due to the introduction of non-native species, disease and pollution. They normally live within mineral rich waters that are clean and well-oxygenated.

White clawed crayfish are protected by UK law under the Wildlife and Countryside Act 1981 (as amended).

How is it carried out?

The surveys are conducted by a licensed ecologist between July and October when the species is most active. Up to two visits may be required. For daytime surveys, the ecologist will undertake a manual search in shallow, low flowing water, looking under rocks and checking crevices and tree roots. For nighttime surveys, the ecologist will use torches to spot active crayfish in shallow and deep water.

In some instances, environmental DNA sampling may be completed by collecting water samples and sending them to a laboratory to test for genetic material.

Phase 1 Peat Survey

What is it & why?

Peat consists of partially decomposed organic material, which is formed in waterlogged areas such as bogs, fens, mires and moors over the course of thousands of years. The high levels of water limit the amount of oxygen needed by bacteria to decompose dead plant material, which in turn prevents organic matter from fully decaying thus creating peat that is rich in carbon (and acts as a carbon sink).

Peat is an important habitat and soil substrate and receives protection from several pieces of Welsh and UK planning policy.

How is it carried out?

A Phase 1 peat survey is carried out in areas where peat is known or suspected to be present based on a desk study and potentially results of the phase 1 habitat survey. It will map the depth and distribution of peat deposits by assessing the habitats present at ground level and using probes or handheld augers. Probes are narrow lengths of rod which are pushed into the ground by hand until they hit a harder soil underneath the peat to determine depth.

Augers are used to extract a core of peat to determine consistency of substrate and often how wet it is. Sometimes a core may be taken for further analysis, however most material

removed is replaced.

Environmental Surveys

Groundwater Dependent Terrestrial Ecosystems and Pollution-Related Wetlands walkover survey

What is it and why?

Groundwater Dependent Terrestrial Ecosystems (GWDTE) are wetlands such as fens, springs and bogs, which are fed by groundwater (water held beneath Earth's surface in rock and soil) rather than rainfall or surface runoff. Pollution-Related Wetlands (PWS) are ecosystems that are affected by or actively combat pollution, such as agricultural runoff, urban stormwater and sediments.

Wetland habitats are surveyed to see how much they rely on groundwater and whether they receive water from other sources (rain or surface water runoff). They are very important habitats for biodiversity but are highly sensitive to changes in water quality and volume.

How is it carried out?

Surveyors will carry out desk-based research using data from British Geological Survey, Natural Resources Wales and Natural England to identify areas containing groundwater. Within these areas, surveyors will look at existing records for particular habitats such as wetlands, springs, fens, marsh, bogs and riparian forests (forests with streams or rivers running through them).

Surveyors will visit the site to do a walk over and visually inspect the habitats. These surveys typically use the national vegetation classification botanical survey method (described above) to identify whether or not groundwater dependent plant species are present, confirm their type, composition and condition, and record their location and distribution. They may use cameras to take photos of plant communities.

Depending on the availability of existing groundwater records, surveyors may need to carry out remote sensing to monitor groundwater flow pathways to confirm the source of water feeding the wetland habitats. This involves the use of a remote sensor, a portable instrument that may also have a probe attached that can be dipped into the water to check for water flow rates and water quality.

Landscape and Visual Impact

What is it & why?

A landscape and visual impact assessment (LVIA) assesses changes to the landscape and visual environment as a result of a development proposal. It aims to strengthen the quality of the design of the development and lessen any harmful impacts on views from neighbouring areas and on the character of the surrounding landscape.

How is it carried out?

Desk based research is carried out by a Landscape specialist who will identify the existing landscape conditions of the site and its surroundings prior to any field surveys. Key landscape features they will look for include landform (for example hills, mountains, plains, valleys, beaches and cliff), terrain, land use (residential, commercial, industrial etc), vegetation and settlement patterns. The surveyor will use this information to identify key locations that provide good views of the site from different angles and positions. These are called 'viewpoints'.

The surveyor will visit the viewpoints to look into the site and may take photographs from the viewpoints to record what the area currently looks like without the proposed development. The visual inspection and photographs are used to categorise the existing character of the landscape and understand the sensitivity of the environment to visual change brought about by the type of development being proposed.

Traffic and Movement

What is it & why?

A traffic and movement survey is used to understand local travel patterns and the extent of traffic at key transport routes including roads and Public Rights of Way. The information is used to understand how road and Public Right of Way networks are used currently and how these may be impacted by a proposed development through an increase in temporary construction traffic. The data collected also shows peak travel and traffic times which help to manage construction timings and minimise impacts to local people.

How is it carried out?

The survey method includes automated traffic counting and footfall counting surveys of public highways and public rights of ways to identify level of usage / traffic flows and peak traffic flows, in consultation with the relevant Highways Authority. Cameras and/ or wireless battery-operated boxed counters are attached to fences, trees or hedges at appropriate access and egress locations to record passing traffic and footfall. This takes place for approximately 7 consecutive days.

For road traffic, induction loops and counting boxes are used, positioned on the roadside, and cameras may be attached to road signs or street furniture. For public rights of way,

cameras will also be used but if there is nothing suitable to attach them to, manual counts are done by enumerators.

Noise Monitoring

What is it & why?

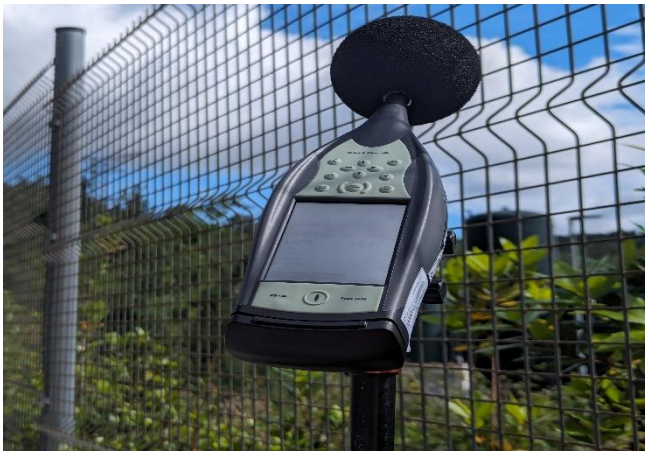
Noise monitoring surveys are undertaken to understand the existing noise levels around the site and sources of existing noise (such as traffic noise, noise from livestock, industrial noise). The survey typically measures noise levels in different contexts such as, but not limited to, residential, industrial and commercial areas. The information gathered is then used in a computer model together with information on known noise levels created by construction equipment and the development itself. The model will show the likely (predicted) noise levels that would occur across varying distances from the site.

Noise monitoring is essential for assessing the noise impact of the development on people and the natural environment. This is done by comparing the existing noise levels people experience during the day and night, to the predicted noise levels resulting from the proposed development during construction and operation.

How is it carried out?

Noise monitoring locations are identified before the field survey, focusing on sensitive receptors such as residential areas, hospitals and schools, among others. Whilst the survey is not seasonal, it is carried out during school term time to ensure it is representative of typical levels of day-to-day activity. Weather conditions also play a large part with dry weather and low wind speeds being preferred.

The survey involves using specific equipment such as a Sound Level Meter (SLM), which is placed in the identified noise monitoring locations and left for a period of seven days. The SLM is a handheld device with a microphone on the end and screen to show the



Typical noise monitoring

level of noise being recorded in decibels. The devices collect the noise data continuously for the 7-day duration. Sometimes, surveyors will remain with the equipment and monitor the SLM in person for some or all of the time, especially if there is nowhere safe or secure to leave the SLM in situ.

Arboricultural and Vegetation Surveys

What is it & why?

Arboricultural (tree) surveys are done to identify the species, distribution, age, health and condition of trees and woodlands to help us understand how we can design the development around them, and to preserve or enhance trees and woodlands for their biodiversity and amenity value. The information collected during the surveys will be used to decide which trees should be retained and which can be removed, for example due to poor health, condition or low ecological value. This ensures that the development proposals remain environmentally responsible. Information is also gathered on the root zones of trees that will need to be protected from passing heavy machinery passing

More generally, vegetation surveys may also be required to look at the species, distribution and condition of grasslands, scrubland, wetland vegetation and hedgerows for the same reasons as arboricultural surveys.

The surveys also highlight any trees that are protected by Tree Preservation Orders (TPOs), as well as ancient and species rich hedgerows.

How is it carried out?

Tree surveyors visit the site and carry out their assessment in line with the appropriate British Standards, which is currently **BS5837**. They will identify and survey trees that are positioned within or adjacent to the development site and its construction compounds.

Surveyors begin by visually identifying the species of each tree, for example whether its oak, ash or elm (to name a few) and assessing key characteristics of each tree including age, height and canopy spread. The surveyors will also check for signs of disease, for example ash dieback and document the findings of each. Equipment typically used for this assessment involves diameter tape to measure the girth of tree trunks, clinometer or laser hypsometer to measure the height, survey stakes to mark the area of root zones that need to be protected from ground disturbance. Surveyors will also refer to field guides to confirm species identification. GPS devices and cameras will be used to map the location of trees, woodlands, hedgerows and canopy size and to document their condition.

The wider vegetation survey involves a similar practice to arboricultural surveys by walking the site to assess overall habitat condition. Surveyors identify and map different

habitat types, such as scrubland, woodland, grassland, hedgerows and wetland, noting its health, structure and ecological value.

Agricultural Land Classification Surveys / Soil Surveys

What is it & why?

An Agricultural Land Classification (ALC) Survey is required for assessing the quality of farmland and the grade of land, which is now a formal requirement in England and Wales. The UK planning system protects high-quality agricultural land through the Best and Most Versatile (BMV) classification, which grades land quality from 1 to 5, with Grade 1 representing the highest quality.

How is it carried out?

An ALC / Soil survey is carried out using methods such as auger boring (using a handheld auger that might look similar to a large screw), soil probing (using similar equipment as for peat probing) and digging square pits or trenches to assess the soil composition, and structure. The surveyors will record information including texture, layer depth, stone content, drainage characteristics, soil structure and wetness. Once surveys are complete, the soil and land will be returned to the state that they were in originally.

The surveyor will also look at the land's physical characteristics and will determine how suitable it is for farming under the BMV classification system, as well as recognising the quality of soil.

Air Quality Monitoring

What is it & why?

Air quality monitoring surveys are carried out to assess the potential impact of the development proposals on the local air quality during both construction and operational phases of a development proposal. It is needed as part of the planning process, to ensure that the proposals do not introduce new emission sources that could worsen the air pollution.

How is it carried out?

Methods for undertaking air quality monitoring include the placement of diffusion tubes in air quality monitoring locations, similar to those methods identified above. The tubes monitor the extent of harmful air pollutants such as nitrogen dioxide in the air by absorbing pollutants into a mesh located in the tube. To gather information on the average pollution concentrations, the tubes are left at the locations for around 4 weeks. The tubes are then removed and further analysed to understand the amount of air pollutions currently in the air. This information is used to understand how air pollutants

generated by the proposed development will impact the existing air quality.

Heritage Surveys

Archaeological Geophysical survey

What is it & why?

Geophysical surveys allow us to identify anomalies underground that could be an archaeological feature such as a Roman road, without having to dig. They are a non-invasive method of surveying quite large areas of land.

Identification of natural and man-made features such as cavities, buried obstructions, utilities and other geological variations can help engineers and designers address the possible risk of encountering unexpected buried artefacts or structures during construction. It also allows archaeologists to identify areas of archaeological interest that may warrant further investigation.

How is it carried out?

Surveyors use specialist equipment that map out changes in the soil. There are multiple methods to do this, such as magnetometer surveys which measure the small changes in the Earth's magnetic field across a chosen area. These surveys are quick, non-invasive, and cost-effective for covering large areas.

Another method is Ground Penetrating Radar Surveys (GPR) which is a non-invasive scan that uses radio waves to see what's underneath the ground. A small antenna sends pulses into the ground and records the echoes that bounce back from changes in the soil, stone, and ditches.

The data created from these surveys is then turned into useable images and plans that show the shape and depth of pits and disturbed ground.

Archaeology and Historic Environment walkover survey

What is it & why?

Archaeology and Historic Environment walkover surveys examine the ground in a certain area where there may be archaeological features.

Walkover surveys are a practical and systematic method of surveying and recording visible archaeological remains within the landscape.

How is it carried out?

Surveyors will walk around the area with a handheld GPS, camera and map and record

their findings. They will look for signs of archaeological sites such as old field boundaries, or leftover bricks or buildings from medieval hillforts and other archaeological sites.

Engineering Surveys

Drainage Assessment Site Walkover

What is it and why?

The purpose of the site drainage assessment is to identify all existing drainage features within the land parcel associated with the project. This includes both artificial and natural drainage systems such as field drains, ditches, culverts, and watercourses. The assessment will establish whether any of these features are located within or in close proximity to proposed foundation footprints, substation platforms, access tracks, or underground cable routes.

Identifying these features at an early stage of the design process ensures that existing drainage infrastructure can be accurately mapped and considered within the project layout. Where conflicts are identified, appropriate mitigation measures, such as diversion or protection of drainage systems, can be incorporated into the design. This approach helps ensure that existing site drainage patterns are maintained and that the project does not adversely affect the current drainage regime.

The findings of the drainage assessment will inform the design of any required pre-construction and post-construction drainage works. These measures will be implemented to maintain effective drainage across the site and prevent disruption to existing land drainage systems. Failure to maintain adequate drainage could adversely affect current land use and may also alter local groundwater conditions, which could in turn impact the stability and performance of the proposed foundation designs.

How is it carried out?

Typically, a surveyor will walk the land to identify the following features:

- Open ditches and watercourses;
- Culverts and outfalls;
- Manholes, inspection chambers, and headwalls;
- Surface water flow paths;
- Signs of land drainage (wet areas, drainage grips, field drain outlets);
- Existing crossings beneath tracks or access routes.

All features are usually photographed, mapped, and recorded using GPS so they can be

accurately incorporated into the project's design drawings.

It is common to liaise with landowners to ascertain any existing drainage plans that they may have to aid in the site walkover as well as desktop studies.

Full Length Walk Over - Infrastructure Locations and Access and Construction

What is it and why?

The purpose of undertaking a full walkover survey of the proposed project route, including access points and substation locations, is to gain a practical understanding of the site conditions that cannot be fully appreciated through desktop studies alone. While Geographic Information System (GIS) mapping and other desk-based assessments provide valuable information during the initial site selection and route development stages, they cannot fully replicate the insight gained from direct observation in the field.

Conducting a walkover survey allows project engineers to assess the physical characteristics of the land along the proposed route and to better understand local conditions. This includes observing terrain, land use, drainage patterns, access constraints, and other environmental or engineering considerations that may influence the design and construction of the overhead line.

The walkover also enables the identification of potential risks, constraints, or site-specific issues that may not have been apparent during the desk-based assessment phase. Early identification of such constraints allows them to be considered within the design process and, where necessary, appropriate mitigation measures to be developed.

The walkover survey provides an important verification step within the route assessment process, ensuring that the proposed alignment and associated infrastructure can be delivered in a safe, practical, and environmentally responsible manner.

How is it carried out?

The walkover survey is undertaken by physically walking the length of the proposed route corridor wherever access allows. Where direct access is restricted, the route may be inspected from nearby vantage points such as field boundaries, public rights of way, or adjacent land. During the walkover, engineers and surveyors assess the general site conditions, including:

- Topography and ground conditions
- Existing land use

- Accessibility for construction vehicles and plant
- Potential tower foundation locations
- Existing utilities and infrastructure
- Environmental sensitivities or protected features

The survey team records any constraints or potential risks that may affect the project, such as:

- Steep or unstable ground
- Wet or poorly drained areas
- Watercourse crossings
- Environmentally sensitive habitats
- Proximity to buildings or infrastructure
- Restricted access points

Identifying these issues early allows them to be considered during the detailed design and construction planning stages. Observations made during the walkover are systematically recorded using GPS coordinates for key features, Field notes and survey forms, Photographic records and / or Annotated route plans or digital mapping tools.

Following completion of the walkover, the findings are reviewed alongside the existing desk study data to identify any discrepancies. Any newly identified constraints are then incorporated into the project's route development and engineering design.

Geomorphological Site Walk Over

What is it and why?

The purpose of undertaking geomorphological site walkovers is to gain a detailed understanding of ground conditions and the movement of soils and sediments across the proposed project area. While desktop studies provide an initial indication of potential geomorphological features and risks, field inspections are necessary to verify these findings and identify any site-specific conditions that may not be evident from mapping or remote data.

The walkover surveys focus on areas highlighted during the desk-based assessment as having potential geomorphological sensitivities, such as locations with an elevated risk of landslip, areas of steep or unstable slopes and watercourses that may exhibit active channel movement or erosion.

Undertaking site visits allows engineers and surveyors to directly observe evidence of geomorphological processes, including soil creep, erosion, sediment transport, slope instability, and bank erosion along watercourses which are often difficult to identify

accurately through desktop analysis alone.

The observations gathered during the walkover surveys enable the project team to review the proposed route and associated infrastructure in the context of any geomorphological risks identified on site. Where necessary, these risks can then be considered within the design and construction planning stages, allowing appropriate mitigation measures to be incorporated to reduce potential impacts on ground stability and natural geomorphological processes.

How is it carried out?

During the walkover, geomorphologists or trained surveyors visually assess the landforms and ground conditions noting observations such as:

- Evidence of slope instability, such as landslips, tension cracks, or slumped ground;
- Soil creep or surface movement on hillsides;
- Erosion features, including rills, gullies, or exposed soils;
- Peatland features (where present), such as hagging, erosion gullies, or peat pipes;
- Watercourse morphology, including bank erosion, sediment bars, and active channel migration;
- Areas of water saturation or poor drainage; and
- Sediment transport pathways from slopes to watercourses.

Surveyors assess whether these features appear active, historic, or stable, and whether they could present a risk to proposed infrastructure.

All observations are systematically recorded during the walkover using, GPS or GNSS devices to capture feature location; Field notes describing observed geomorphological processes; Photographic records of key features and Annotating maps / GIS. Drones may be used for areas that are unsafe to be inspected otherwise.

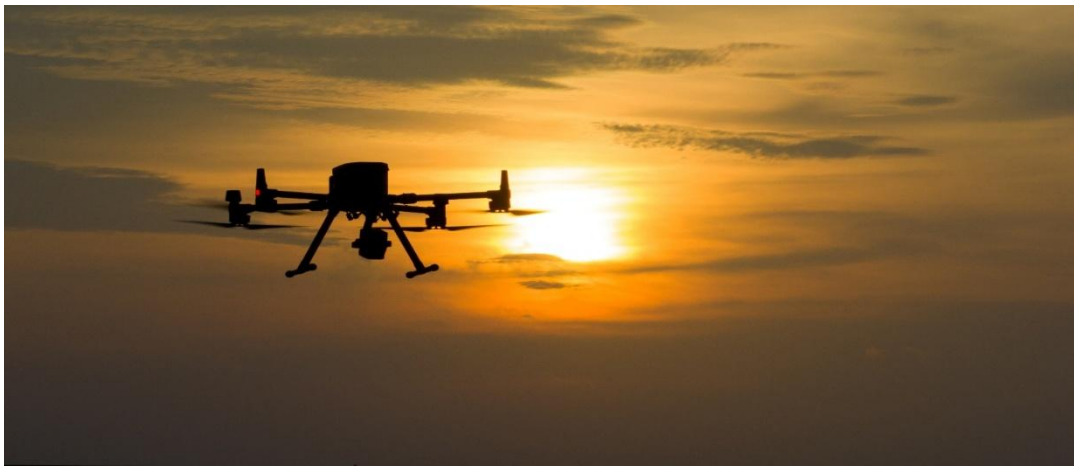
LiDAR Surveys (Drone Based)

What is it & why?

Light Detection and Ranging (LiDAR) is a method of collecting measurable mass data and can be used for creating detailed maps of ground profiles for planning and hazard assessments. It is a non-invasive survey method that collects co-ordinates on all visible physical features within range of the device and produces the results in the form of a “point cloud”. Drone Based LiDAR collection can collect high-definition data (50mm resolution) and is one of the fastest surveying techniques available.

How is it carried out?

A laser-based LiDAR scanner is mounted on a drone which is flown generally in 1km sections (500m each way from the take-off and landing zones) at roughly 50m height above the ground. One flight can capture roughly a 40-50m swathe of points which accurately depict the shape, size, and position of every physical feature that is within the sensors direct line of sight and within the range of detection. Ground truthing points must be established throughout the flight route using traditional ground-based GPS equipment for Quality Assurance to guarantee the accuracy of the collected data.



LiDAR scanner mounted on a drone

Topographical Surveys

What is it & why?

A topographical survey is an accurate representation of an area of land or a defined boundary, which is scaled and detailed according to the spatial considerations.

You need to visualise the land you want to develop and plan the scope of work needed.

Data collection includes equipment such as total stations, GPS systems, as well as drones. It records the levels, contours and elevations of the land that helps designers and engineers understand the surface conditions and terrain features.

How is it carried out?

Specialised equipment is used to measure the height and position of natural and man-made features. Typically, this is done through LiDAR surveys where they would use a fixed wing drone that flies above 300m to gather the data with a couple of ground stations that would be placed on public land. The data from the survey is then made into a drawing that shows the details of the land surveyed.

Hydrological Features Survey

What is it & why?

The hydrogeological site survey involves the visual inspection and recording of hydrogeological features that may interact with the proposed project route. Particular attention is given to locations where the proposed alignment intersects or lies in close proximity to features that may influence groundwater conditions.

These locations are initially identified during the desk-based assessment, which highlights areas where groundwater or hydrogeological features may present potential constraints. The purpose of the site walkover is to verify and further investigate these features in the field to better understand their characteristics and any potential interaction with the proposed infrastructure.

Undertaking the survey on site allows engineers and surveyors to observe groundwater-related features directly, such as springs, seepages, wet ground conditions, and areas of groundwater emergence. These observations help to confirm or refine the findings of the desk-based study.

The information collected during the walkover survey supports the design process by enabling the project team to consider hydrogeological conditions when developing the route alignment, foundation design, and construction methodology. Where necessary, the findings may also inform the development of mitigation measures to minimise potential impacts on groundwater and maintain the existing hydrogeological regime

How is it carried out?

During the walkover survey, hydrogeologists or trained surveyors visually inspect the site for evidence of groundwater presence or groundwater–surface water interaction. Observations may include:

- Springs, seepages, or groundwater emergence points
- Permanently wet or waterlogged ground
- Peatland or saturated soils indicating shallow groundwater
- Baseflow contributions to watercourses
- Changes in vegetation indicative of groundwater-fed conditions
- Existing wells, boreholes, or abstraction points
- Evidence of groundwater flow paths along slopes or within valleys

Surveyors also assess topography and geological exposures that may influence groundwater movement. Key features identified during the survey are recorded using; GPS equipment to capture feature locations; Photographs of observed hydrogeological features; Field notes describing groundwater conditions and site characteristics; Annotated mapping. Where accessible, existing springs, wells, or boreholes may also

be inspected to understand groundwater levels and flow characteristics.

General Site Walkover

What is it & why?

A General Site Walkover is a basic site survey commenced at the early stages of a project. It involves physically walking across the project site and its surrounding area to observe and record information that could influence design, planning, routing or construction feasibility. It typically forms part of the early site investigation process before any detailed surveys or intrusive works begin.

The walkover acts as an initial review to confirm whether the preferred route or project area is workable before more detailed investigations take place. This allows those surveying to identify any potential geological, ecological, topographical or contamination issues that may impact a project at construction phase

How is it carried out?

The walkover is carried out by up to two surveyors who move through the site using GPS equipment to log significant features, record any changes from the desktop study, and document anything that could impact the project. They capture important information such as notes, photographs, and location points, creating a record of the site's condition that can be reviewed and integrated into the wider project planning.