Owners/Agents

Management Planners

FC Staff

Woodland Access Tracks
Information Note 17

Purpose

A practical guide to help woodland owners and managers to plan, design and construct access routes into woodlands

Versions

Version 1.1: March 2011

Contents

Introduction

Without suitable access for machinery, many woodlands cannot be managed economically.

This guidance note is an introduction to planning and constructing tracks in woodlands. It is not a comprehensive forest engineering guide and does not cover the construction of forest roads for which you are advised to seek specialist advice. It is aimed at woodland owners, managers and contractors who are involved in track construction. The diagrams show how tracks should and should not be constructed and the tables give specifications that are not available in other publications. This guidance has been drawn up in consultation with Forestry Commission Wales civil engineers, who provided the specifications and practical advice.

Tracks should generally be planned as a permanent facility for the management of woodland. Poor design or construction can result in inadequate access and may cause a great deal of economic and environmental damage resulting in high repair and maintenance costs or even legal problems!

On the other hand, a well planned and properly constructed track will have minimal impact, will require little maintenance and will certainly be much cheaper in the long run. So you need to start by planning it carefully in order to get it right first time.

Where there are references to roads within this document, this is for advice only. Forestry Commission Wales does not provide grant aid for the costs of creating or upgrading forest roads. Please note that all tracks funded through Better Woods for Wales must be kept fit for purpose for 10 years from the date of funding. Therefore any damage or excessive wear such as that caused by harvesting or natural events must be repaired and the track re-instated immediately.

Things to consider

1. Why do you need a track?

In BWW it will most likely be for harvesting timber and subsequent management. How much do you plan to extract and what sort of machinery will be used? How often will you be working in the woodland and do you need access all year round?

2. Choice of route

Where is the best place for the track to enter the woodland? This is very important if access is directly onto a public highway. If you are extracting timber for onward transport by lorries, where is the best place for the lorries to load? Any new access from a public road will require full planning permission from the local authority (this includes the upgrade of any existing access).

The track should reach the areas of woodland most in need of access but avoid unnecessary travel up and down slopes. The track should avoid wet areas and hazards, as well as any valuable environmental or archaeological features. Avoid hairpin bends, especially on steep slopes.

All forest tracks should be planned in accordance with the current Forest and Water Guidelines.

In exposed woodlands with unstable crops, cutting a track line will increase the risk of windblow. If a crop is too unstable to thin, avoid cutting a track through it.

3. Appearance in the landscape

Try to avoid cutting tracks on prominent unwooded slopes. Follow the land form and avoid long straight routes especially along external boundaries. Consider additional planting to conceal tracks across open ground in sensitive areas. The BWW scheme is able to support track work across open land to provide access to woodlands, providing the route and specifications are appropriate.

4. Health and safety

This document is not designed to be a complete guide to track building but as an aide-mémoire for applicants when planning a BWW scheme. We recommend that a qualified engineer (see definition within document) is engaged to plan and supervise the construction of tracks.

Applicants should be sure that all of the relevant health and safety legislation has been followed and in particular the Construction Design and Management Regulations 2007 and 'Managing Health and Safety in Forestry' Health and Safety Executive leaflet INDG 294

What do we mean by a track?

Different specifications of access routes apply according to the intended purpose.

Table 1 - describes the most relevant categories for woodlands

Type of route	Purpose	Type of site	Notes
Light tracks	To provide access to ATVs or horses.	On very sensitive sites or where only very small sizes and amounts of timber need to be harvested at a time e.g. coppice.	Varies, but generally much narrower than tractor tracks, around 2.0 – 2.5 metres wide. Horse routes need to avoid uphill extraction.

Type of route	Purpose	Type of site	Notes
Tractor tracks/ skidder	To allow working access to tractors and / or light 4 wheel drive vehicles.	Small woodlands or steeper sites where skidding and static winching are the most cost effective method of harvesting.	These are sturdy tracks wide enough to carry a tractor or light vehicle, running width 3.0m – 3.5m widening to 4.0m on bends with a minimum radius of 6.0m. Max. gradient 20% but usually 10 – 15 % with a cross fall of 5% and lower gradients on bends.
Forwarder tracks	Extracting large volumes of (cut to length) timber quickly using purpose built forwarders or forestry tractors with timber trailers.	Larger woodlands on terrain suitable for short-wood harvesting systems.	These are more heavy duty and wider than tractor tracks with gentler bends. 4.0m running width. Bends minimum radius 8.0m with 5.0m running width. Max. gradient 20% but usually 10 – 15 % with a cross fall of 5% and lower gradients on bends.
Forest roads **(These are not funded under BWW)**	Usually designed to carry 38 tonne articulated lorries. Lower specifications can be used for smaller lorries.	Larger, commercial woodlands where it would be more economic to bring lorries into the woodland than to extract timber to existing lorry roads.	Detailed specification to ensure good drainage and safe use. Stone is used to provide strength. Gradients must not exceed 10%. Running width 3.4m, wider (up to 6m) on bends. Geometry and specification are critical.
Turning areas stacking areas	To allow vehicles to turn around. On forest roads turning areas may also be	Essential on all exceptcircular routes	These can be round or T shaped depending upon the gradient and should

Type of route	Purpose	Type of site	Notes
	designed for stacking timber.		be built to the same standard as the track or road.
Transfer points	A lay-by beside a highway where timber can be stacked for collection by lorry avoiding mud on road.	Smaller woodlands or where it is not cost effective to bring lorries into the woodland. Steep sites are difficult.	These need to allow a lorry to park off the highway safely and should be long enough to provide enough space for timber to be stacked.

This guidance note concentrates on tractor and forwarder tracks as these are the most commonly constructed routes in woodlands. Some of these principles also apply to light tracks. Forest roads need to be designed to a more detailed specification in order to be safe and effective for use by lorries and they should therefore be designed by a civil engineer. We also recommend the use of an engineer for the construction of transfer points, culverts and any other watercourse crossing.

Planning access tracks

Deciding where your track will go

Get to know the woodland and the terrain by walking it thoroughly before deciding where to put the track. Keep an open mind and avoid siting your track along existing paths and rides simply because they are there unless they are suitable for timber extraction and modern machinery. Figure 1 illustrates some of these points. Mark the route of your track using stakes in open spaces and by tying bright tape around trees where they are more closely spaced. Avoid spraying trees to mark the track line as you are unlikely to get the correct alignment first time. Given the number of factors to take into consideration it really is worth taking advice from an engineer on the route of the track at an early stage.

Planning permission

It is essential to have the necessary permissions before constructing tracks. Local authorities usually regard the construction of tracks as permitted development but under the Town and County Planning Order 1955, "developers" are obliged to apply to the local authority for "determination" before construction in order for the planning department to decide if full planning permission is required. Any new entrances, transfer points and tracks in designated areas will require planning permission. These costs will not be funded by FCW under BWW.

You need to submit to your local authority a description of the work involved, including the types of materials to be used, a plan showing the route of the track together with a fee.

They will often approve the work by granting a "General Development Order". However, if the track runs within 25 metres of a public highway or if the site is particularly sensitive, such as in a national park or an Area of Outstanding Natural Beauty (AONB), they may ask you to apply for full planning permission. It is sensible to submit your proposals to the local authority early.

There may be regional variations between councils and planning authorities.

Environment Agency

The Environment Agency is responsible for regulating water quality and is able to prosecute in cases of pollution for which heavy fines can be imposed. Consent is required from the agency before any structure, which will affect water flow, is erected or modified. This affects any track that needs to cross a watercourse marked on a 1:50,000 Ordnance Survey map. This is the industry standard and the agency is entitled to charge a fee per crossing, although in practice, a single fee will often cover all crossings within a scheme. Again it is advisable to discuss your proposals with the Environment Agency at an early stage. These costs will not be funded by FCW under BWW.

Environmental Impact Assessment (EIA) Regulations

The EIA regulations now include the construction of tracks, borrow pits, and quarries. Borrow pits tend to be small regular extractions along a track route and quarries larger areas of excavation. Larger projects or those on sensitive sites may require an EIA. FCW is responsible for the EIA (forestry) regulation and will decide whether an EIA is needed. This will be done prior to processing any application for grant aid for woodland tracks. However, the regulation applies equally to non-grant aided projects and so you should seek a determination on all projects including upgrading existing tracks. No charge is made by FCW for an EIA determination.

Track work outside of BWW

EIA regulations apply to all tracking projects, irrespective of how they are funded. If you are planning a track outside of the BWW scheme (including upgrade work) you should seek an EIA determination from FCW.

Download the Determination Form from the FCW website

No charge is made by FCW for EIA determinations, and the procedure will be completed within 28 days.

Designated sites

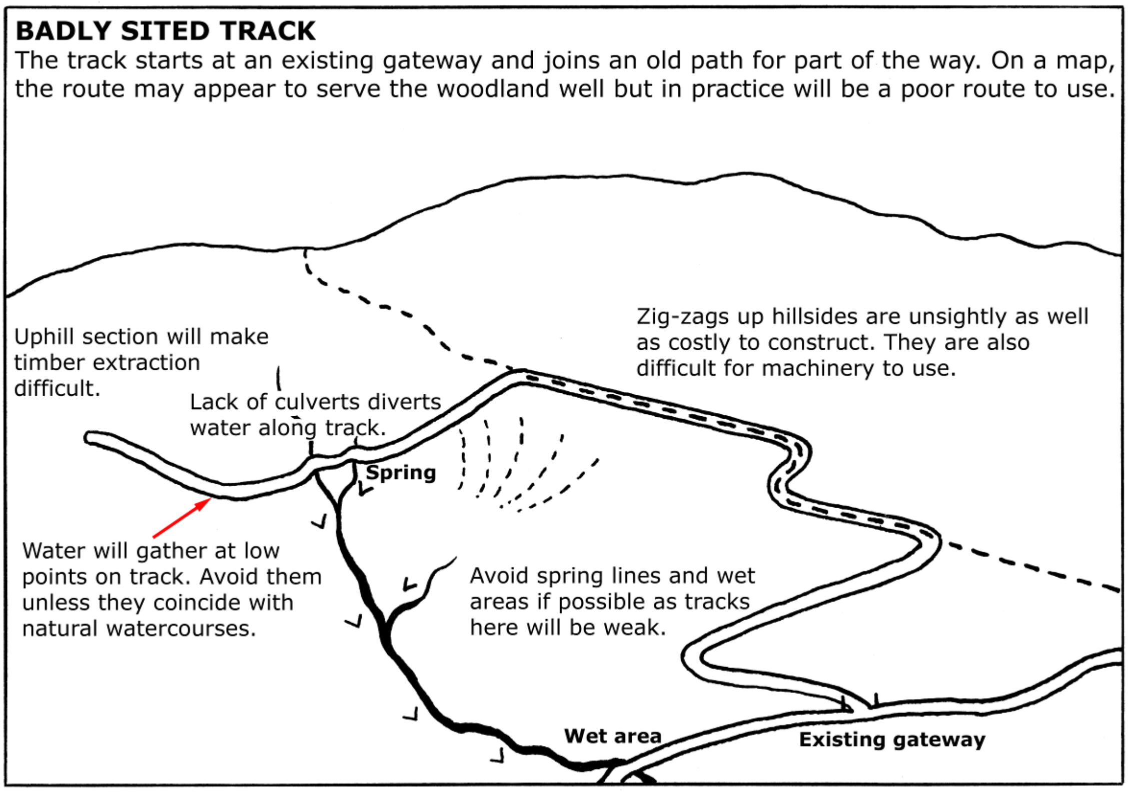
If the woodland is designated as a Site of Special Scientific Interest (SSSI), a Special Area of Conservation (SAC), a Special Protection Area (SPA) or a Scheduled Ancient Monument

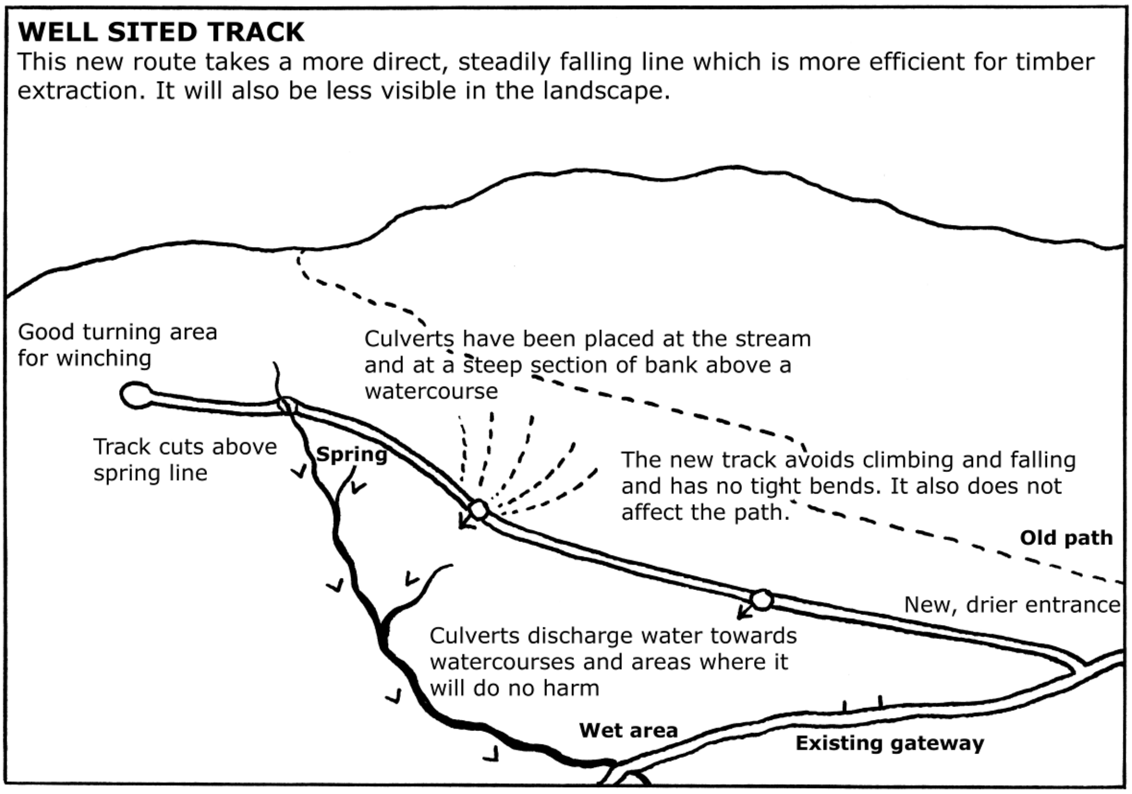
(SAM), you need the formal consent for the operations you would like to carry out from the relevant statutory body. In Wales this would be the Countryside Council for Wales (CCW) for all SSSIs. In the case of SAMs the statutory body is Cadw (Welsh Historic Monuments). For SACs and SPAs Forestry Commission Wales is the competent authority, and will seek advice from CCW if necessary.

Tracking can impact on all European Protected Species (EPS) therefore it must be a consideration when planning a track.

Planning the access routes in woodlands

Figure 1 - View of a sloping woodland where the ground is not freely drained





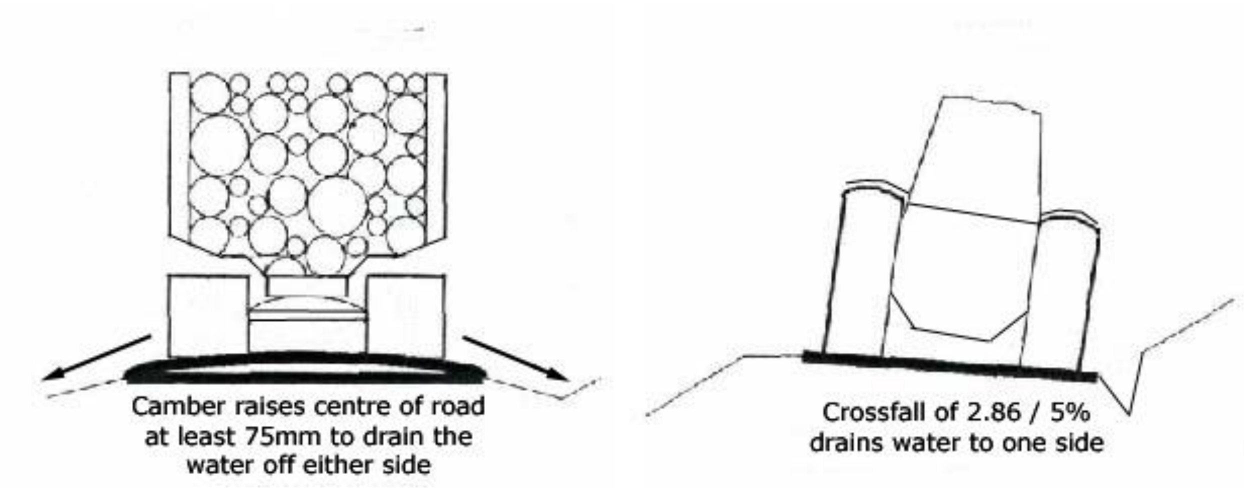
Drainage

Good drainage is fundamental to the strength of across routes as any wet road or track will be weak. Tracks and roads need to be designed to

- Prevent water collecting on the surface, which will make the running surface weak.
- Keep water away from the running surface to prevent erosion by run-off from storms.

Roads and tracks generally do this in different ways and these are illustrated in figure 2.

Figure 2 - Road and track profiles



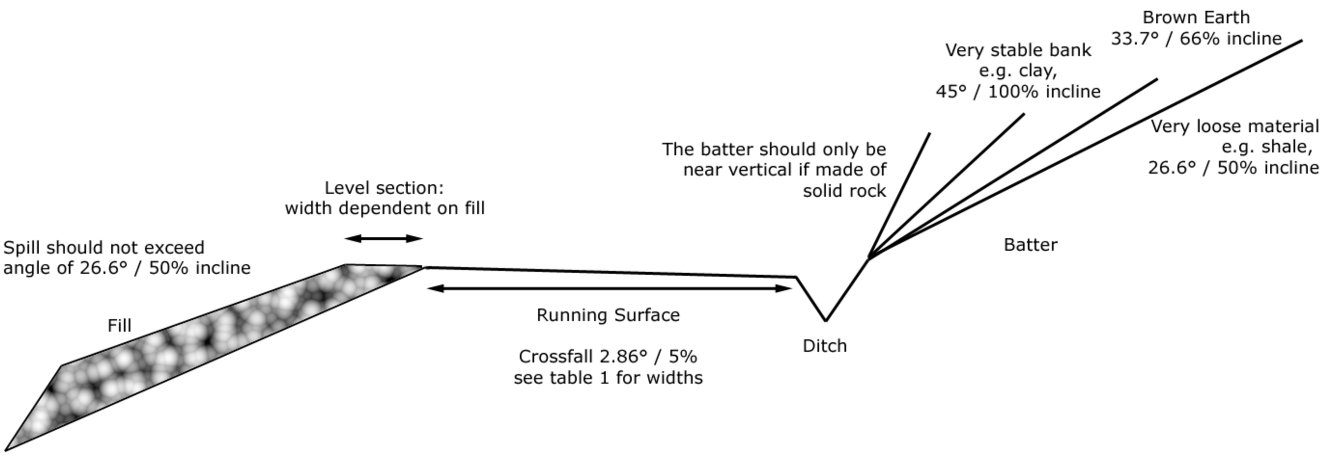
Road profile **Track profile**

Side slopes are usually the best places to build roads and tracks as it is much easier to channel the water away. The ground is much drier and firmer than on flatter areas. However, in addition to land form, the underlying geology will have a great effect upon the way in which tracks need to be built and their strength. Freely draining slopes such as shale banks are the driest and easiest places to construct tracks. However, on less well drained ground, construction is more difficult and some soils such as peat and clay need particular techniques for tracking. Simply adding more stone on top of a wet route is no substitute for drainage and can be an expensive mistake!

In addition to the cross fall, on side slopes you need to design the angle of batters according to the strength of the underlying material. Weaker ground needs to be graded to a gentler angle in order to provide a stable bank. Batters that are too steep will crumble onto the running surface, making the track narrower and blocking the drainage. Figure 3 shows the appropriate angles for batters on different materials. If batters are too steep on soft, steep ground there is a potential for slips.

Figure 3 also illustrates that regardless of the base material; the gradient of the spill on the lower side should not exceed 1 in 2. This is in order to provide maximum stability to the lower side of the track and to allow access for timber extraction. Spill slopes and batters cut at a gentle angle will also vegetate more easily than steep faces, which can remain as scars in the landscape for many years.

Figure 3 - Angle of batters and spills



Rainwater runs to the side of the running surface, which forms a shallow V shaped, self-cleaning drain and flows along to the next culvert.

Culverts and cross drains

It is essential to minimise the amount of water diverted along the track by building culverts at all watercourses and springs that are crossed. In addition to this, further culverts may be needed to prevent the volume of water building up in the ditch. Always take care when siting additional culverts to avoid discharging water where it may cause problems downhill for you, your neighbours or on a highway as you will be liable! Water flowing along long sections of track can collect sediment and in these situations you should avoid discharging the water directly into a watercourse: see the Forestry Commission's current 'Forests and water guidelines'. An ideal area would be where it can flow to a low lying area of ground where it can spread out and deposit the sediment before reaching a watercourse: see figure 1. Discharging water into standing crops can lead to waterlogging of the roots of trees resulting in windblow.

As well as being effectively located, culverts need to be of the correct size to cope with storm flows. The size will depend on the nature of the site as well as the area of land that the culvert will drain. A detailed map showing contours is needed to identify and measure the catchment area.

The Talbot formula is a useful starting point for calculating the diameter of culverts needed and values are shown in table 2. However, it is important to understand that this is only a guide as local factors will have a big effect. It is now common for the Environment Agency to expect culverts to have a much greater safety margin as a result of changes in weather patterns, due to climate change.

Table 2 - Talbot values

Catchment Area in ha	1.0	1.7	3.7	4.7	6.6	11.0	16.0	20.0	24.0	33.0	43.0	47.0
Pipe Diameter mm	300	450	500	600	700	800	900	1000	1200	1300	1400	1500

Note: Culverts of 600mm and over need cut off culverts to the discharge ditch. Further guidance should be obtained from the Environment Agency or a competently trained engineer; this would be a qualified civil or agricultural engineer.

This is especially important in mountainous areas and on steep or recently felled areas which will shed water very quickly, as will areas where thin or saturated soil overlies impermeable bedrock such as granite. Springs and drains may exist which can greatly increase the volume of water at wet times of the year and may even bring in water from outside the catchment area. If in doubt, specify a larger diameter as the extra cost is minimal compared to rebuilding a washed out culvert and track. Also remember that small pipes tend to block up more easily with debris so it is better to have one large pipe than 2 smaller ones. In addition to the size of culverts you also need to decide what type of pipe to use. Table 3 sets out the relative merits of the most commonly used pipes.

Table 3 - Types of pipe for culverts

Type of pipe	Advantages	Disadvantages	Comments
Corrugated steel, galvanised, "Helcor/Armco" pipes *(Cannot normally be grant-aided in BWW)*	Cheap, strong. Can be bolted together to form longer lengths using collars	Need to order to correct length because if you cut it shorter, the ends rust. Liable to corrode if laid incorrectly, especially in acid water	Cost effective and durable if correctly installed. Do not use in areas of high acidity.
Twin wall plastic	Light and easy to carry. Very easy to join together and can be cut to length. Will not corrode even in acid water.	A bit more expensive than galvanised pipes at larger diameters. Not quite as strong.	The easiest pipes to work with, ideal for most forestry use especially in smaller sizes.
Concrete pipe *(Cannot normally be grant-aided in BWW)*	Very cheap and strong	Very heavy and only come in 1m long sections. Push fit joints come apart very easily. Installation is difficult Pipes over 60cm diameter need to be concreted in.	Not recommended for forestry use
Perforated plastic land drainage pipe *(Cannot normally be grant-aided in BWW*	Spare lengths often found left over from land drainage jobs.	Weak. Too floppy to lay at correct angle. Bends tend to trap debris	Not suitable for culverts. Do not be tempted to use this type of pipe.

Having planned the location, size and type of pipe, you then need to build your culvert properly. The installation of culverts is set out in Figures 4 and 5. They must be correctly installed in order to cope effectively with storm flows. Larger diameter pipes should be braced during installation. Backfill should be laid in 15cm layers on both sides at the same time and thoroughly compacted.

Sub-standard or poorly located culverts are the most common cause for tracks to wash out.

Culverts should therefore be designed by an engineer and installed by experienced operators.

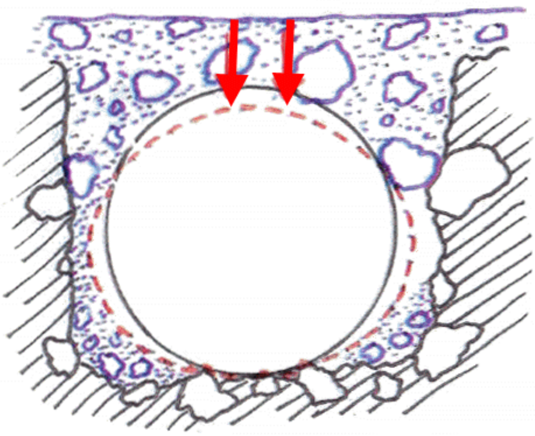
Figure 4 - Installation of a culvert, cross sectional view

BAD CONSTRUCTION

Plastic and Helcor pipes have limited strength and must be supported well.

Poor installation leads to collapse after very limited use.

Thin layer of poor material will not spread load from passing vehicles. This will lead to abrasion and deformation of the pipe and early failure.



Loose backfill will not support pipe and will allow it to deform on loading.

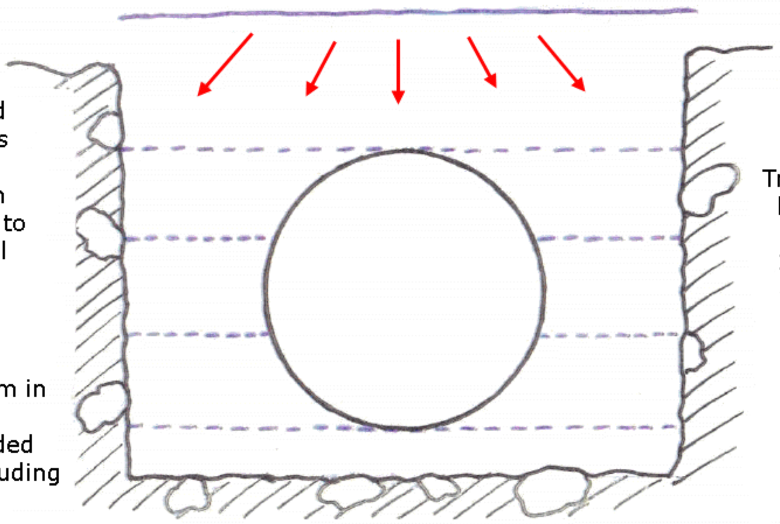
Trench too narrow to allow proper backfilling. Larger stones get stuck leaving cavities below where the pipe is unsupported.

Unprepared bed will not support the pipe well. If material is soft, the pipe will deform on loading. Rocks will penetrate the pipe leading to premature collapse.

CORRECT CONSTRUCTION

A well installed pipe will maintain in shape and strength for many years.

A thick layer of good stone is needed above the pipe to spread the load. See manufacturer's guidance. For Helcor pipes, allow at least 30cm of stone. For plastic pipes, allow at least 45cm of stone.



Fill trench with good stone (MOT type 2 is ideal). Fill in 1.5cm layers, firming down between each layer to ensure that it is well packed.

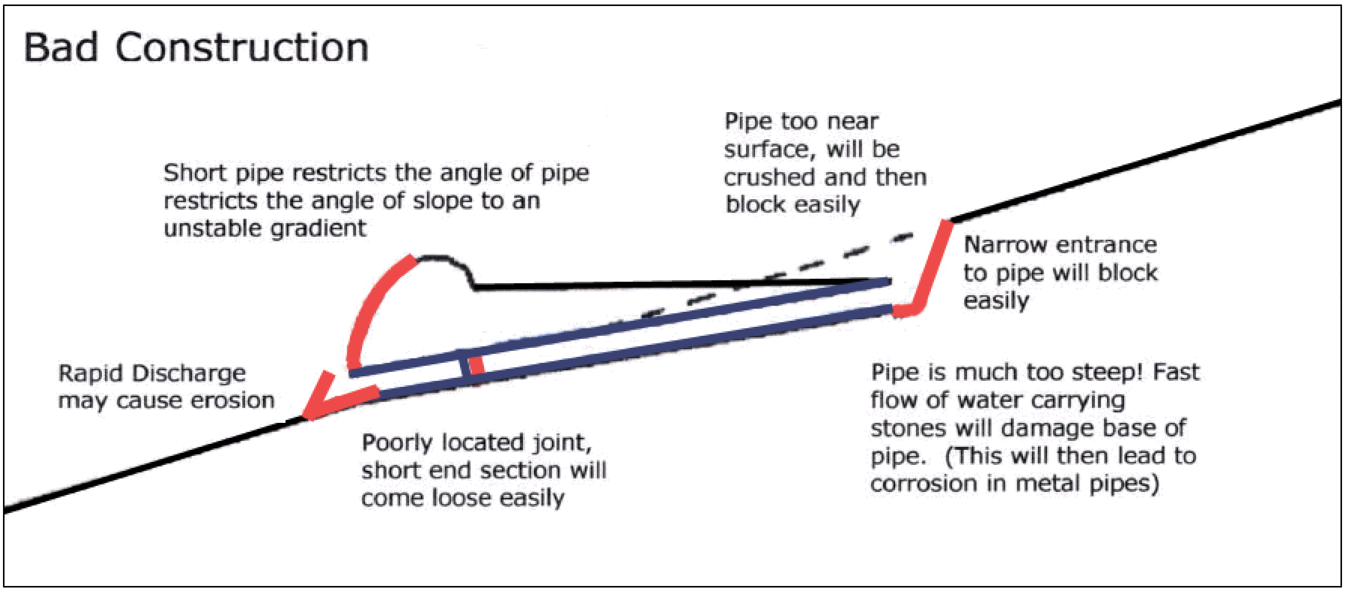
On pipes over 100cm in diameter, special techniques are needed to install pipes, including the use of props.

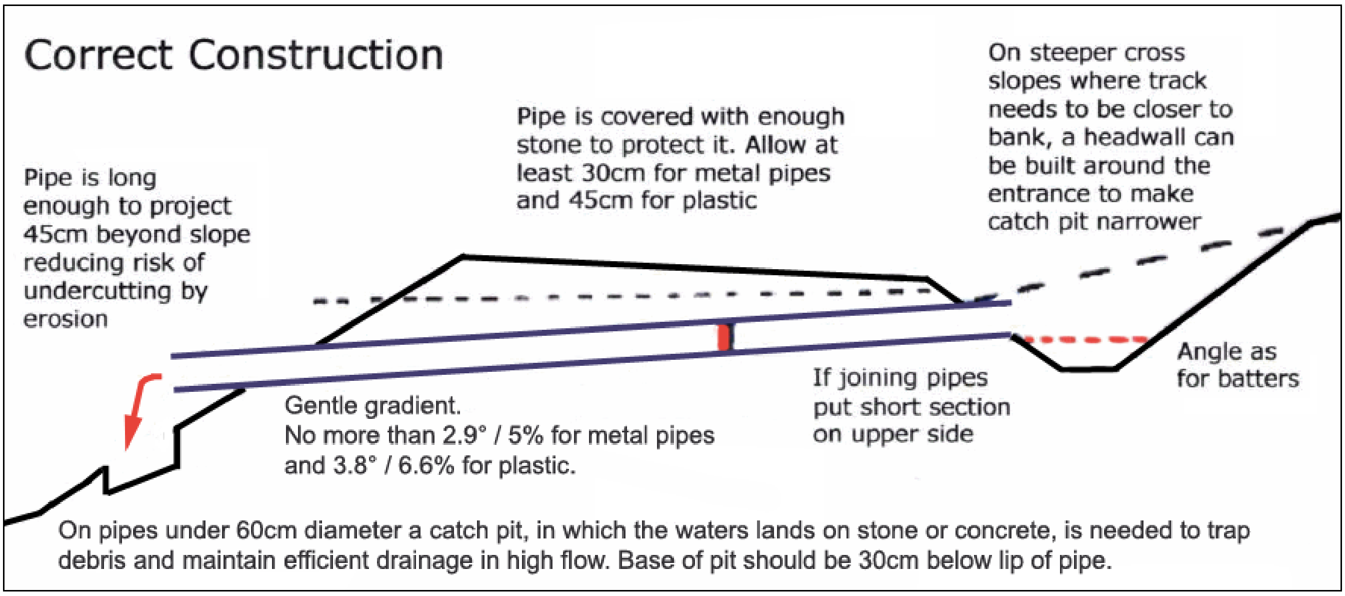
Trench is wide enough to backfill pipe. Cut trench wide to allow at least 30cm between pipe and side of trench to give enough space to compress stone.

The pipe needs to lie on a firm bed of selected material (the ideal would be 10cm of MOT type 1 stone).

Large pipes:
For pipes 100-120 cm diameter minimum cover of 75 cm.
For pipes greater than 120 cm diameter minimum cover of 100cm.

Figure 5 - Construction of a cross-drain culvert, longitudinal section





The above sketches are indicative of good and bad methods, however in larger watercourses, culvert location should be chosen so as not to impede the passage of fish. In certain cases a bridge may be required.

The example given for correct construction would not be applicable where passage is required for fish, in this instance the culvert pipe must be laid flush with the riverbed.

To stone or not to stone a track

Different types of ground have different strengths. If you need access all year round for heavy machinery you may need to add stone to form a strong running surface. This adds greatly to the cost of the track and can only be justified where access for machinery is essential all year round or where the ground conditions are very poor. Table 4 gives some guidance about the depth of stone that might be needed for year round access on various different types of ground.

Table 4 - Depth of stone needed

Type of ground	Recommended depth of stone (for running surface)	Useful tips
Firm shale	No need to bring in stone, self metalling.	Shale can wash out easily so avoid steep gradients and bends.
Brown earth, and weaker shales	Up to 300mm stone. About 200mm if a geofabric is used.	If good stone can be dug on site, compare the cost of extraction to buying it in.
Thick clay	Up to 450 mm of good quality stone is essential to make a strong running surface. About 200mm if a geofabric is used	After formation, "Bind" clay with fine stone before adding coarser stone to build strength.
Deep peat Specialist construction techniques required. Consult an engineer.	If laying directly onto peat, you may need 600-1000mm of stone.	Reduce the depth of stone needed to 300 – 500mm by laying slate waste, (100mm size) or geogrid on top of vegetation and/or brash mat.

Commonly used grades of road stone are:

- MOT type 1 37mm diameter down to dust
- MOT type 2 18mm diameter down to dust

Bringing in stone is very expensive, and different types of stone have different structural properties. If you think that you need to import stone, consult an engineer as costly mistakes can be made by bringing in the wrong material. You also need to be aware of the environmental implications of importing stone. For example, using an acidic stone in a sensitive base-rich area may affect the vegetation. You also should be very careful about using material from old mine workings which can be very toxic and result in pollution. Finally, in sensitive landscapes you should avoid importing stone that will look out of place such as white limestone.

Using the right machinery and operator

Choice of machinery

It is important to use a machine that can cope with the site conditions safely and produce a track cost-effectively. Table 5 indicates the suitability of the main different types of machinery. The most common machine is a 360 degree tracked excavator. However, do not choose a machine solely on the basis of availability and low hourly costs as it may not be able to build a track to the right specification for your site conditions and it may be unsafe. Furthermore, their low outputs can result in slow progress and a higher overall cost than hiring an appropriate machine.

Table 5 - Choice of machinery

Type of machine	Specification	Advantages	Disadvantages	Comments
Wheeled machines For use in restricted access.	2.1m wide, front bucket 1.2 m3 backacter with l8O degree rotation and variety of buckets 0.2 - 0.6 m3	Widely available, easy to transport, hourly rate low.	Unsuitable for soft ground. Unstable on slopes, low power, therefore slow and unable to cope with larger stumps. Lack of 360 rotation limits ability to lay culverts well.	These machines are only really suitable for making tracks on flat easy ground such as shale or sand, where the stumps are small and culverts are not needed.
Tracked machines small 3 – 6 Tonne excavators For use in restricted access.	1.5m wide. Fixed front blade backacter with 360 degree rotation variety of buckets as for JCB.	Narrower and more precise machine than a JCB, able to build narrow tracks and paths. Can work on soft ground and is more stable on slopes than a JCB	Needs to be transported onto site on a small trailer. Similar outputs and power to JCB, struggles with larger stumps.	An ideal machine for light tracks and paths.
6 – 12 tonne 360 degree excavators	2.1m wide. Fixed front blade backacter with 360 degree rotation variety of buckets as for JCB.	Greater power than either of the above, leads to higher outputs. Able to cope with large stumps. Stable on steep slopes and excellent on wet ground.	Less widely available than JCB 3CX, hourly rate a bit more expensive. Needs to be transported by low loader.	An ideal machine for constructing tractor and forwarder tracks, fast efficient and cost effective
Larger excavators	2.7m wide. 360 degree backacter only. Variety of bucket sizes 0.5m to 1.0m3	Powerful and fast, easily coping with large stumps and harder rock. Widely available	Boom may be too long for cutting tractor and forwarder tracks. High hourly rate and transport by low loader make it uneconomical for small jobs.	Ideal for cutting forest roads but too large for working on tracks.
Bulldozers various sizes	Front blade only	Ideal for formation work on very large roads and cuttings.	Lack of backacter means it is unable to lay culverts or grade batters. Push only action is clumsy leading to wide tracks.	Unsuitable for constructing tracks in woodlands.

Note: Breakers can be fitted to all these machines (except bulldozers) for cutting through rock. Larger machines can cut harder rock.

Choice of operator

All operators for the machines listed in table 5 should be suitably qualified to use the machine, and have experience working on forest tracks. The current "industry standard" qualification is a CITB/CPCS licence or FMOC. Checks should be made as to the competency of contractors.

Forestry is very small in relation to the construction industry and operators are not taught about working in woodlands when working towards their licences. Contractors unfamiliar with working in forestry will not be aware of the specification of forestry tracks and will not know how they will be used for timber extraction. Site conditions in woodlands are very different to construction sites and even agricultural land drainage schemes. Woodlands present many unfamiliar problems and hazards to unfamiliar operators. Tree felling and extraction may need to take place during construction requiring co-operation and understanding between contractors. Tree stumps can destabilize machines and operators need to know how to dig them up and incorporate them into the fill. All these things point to using contractors with experience in forestry. If you are in doubt about a contractor's suitability for the job, ask to see an example of a woodland track that they have constructed.

Working methods

Methods of construction should vary according to the type of ground. Guidance is given for working on side slopes, thick clays and deep peat. However, the first operation on site is usually to fell trees along the track line. Avoid wiggling the track around individual trees as this will make the track twisty and the trees are unlikely to survive if left close to the track edge: see fig. 6

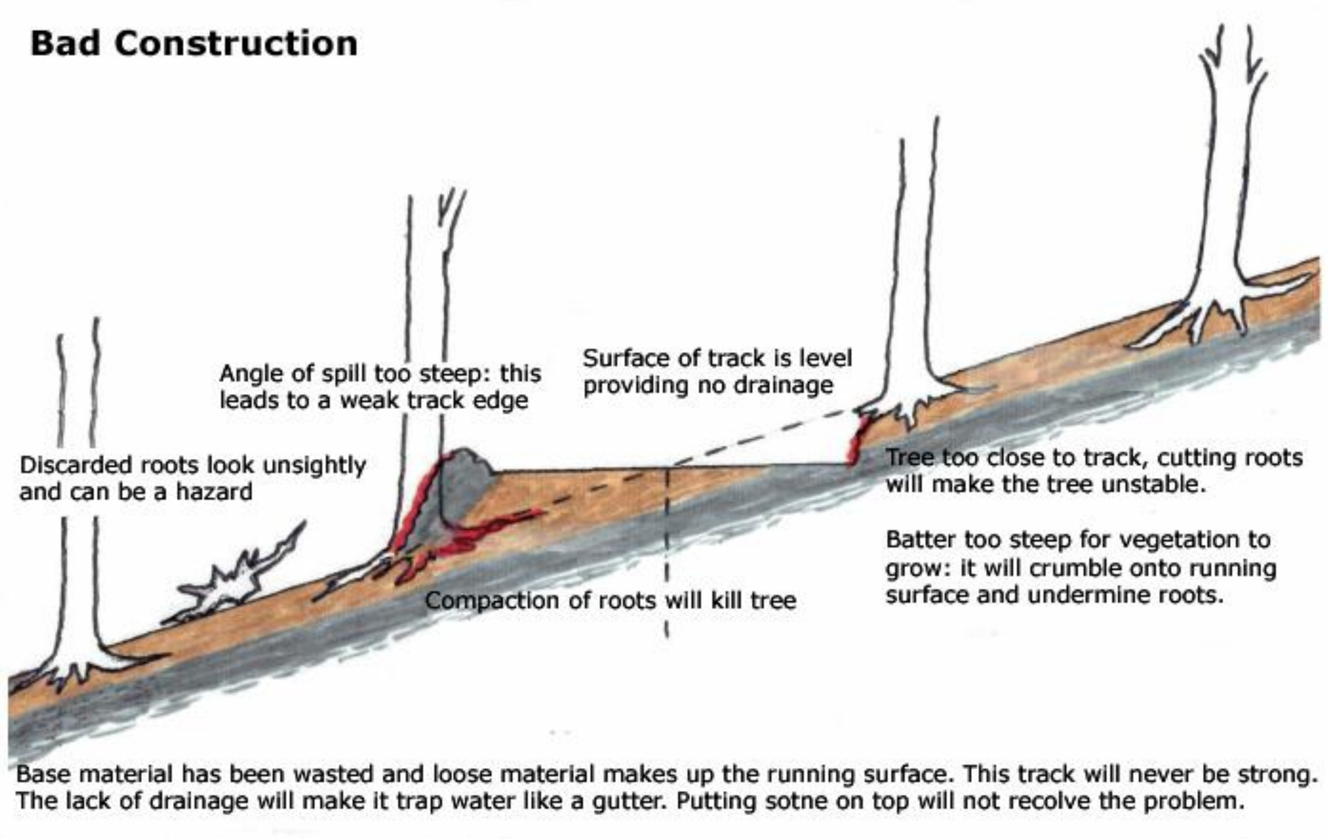
If the ground does not allow for timber to be extracted, then often the best method is for the trees to be felled either up or down slope and the branches snedded out. The machine operator can then move them far enough out of the way with the bucket to construct the track. Extraction can then take place when the track is complete. For larger trees this may not be possible and great co-operation is needed between the harvesting contractor and the machine operator. Do not leave cut tree stumps in the ground along the track line, they will tend to protrude and cause a hazard.

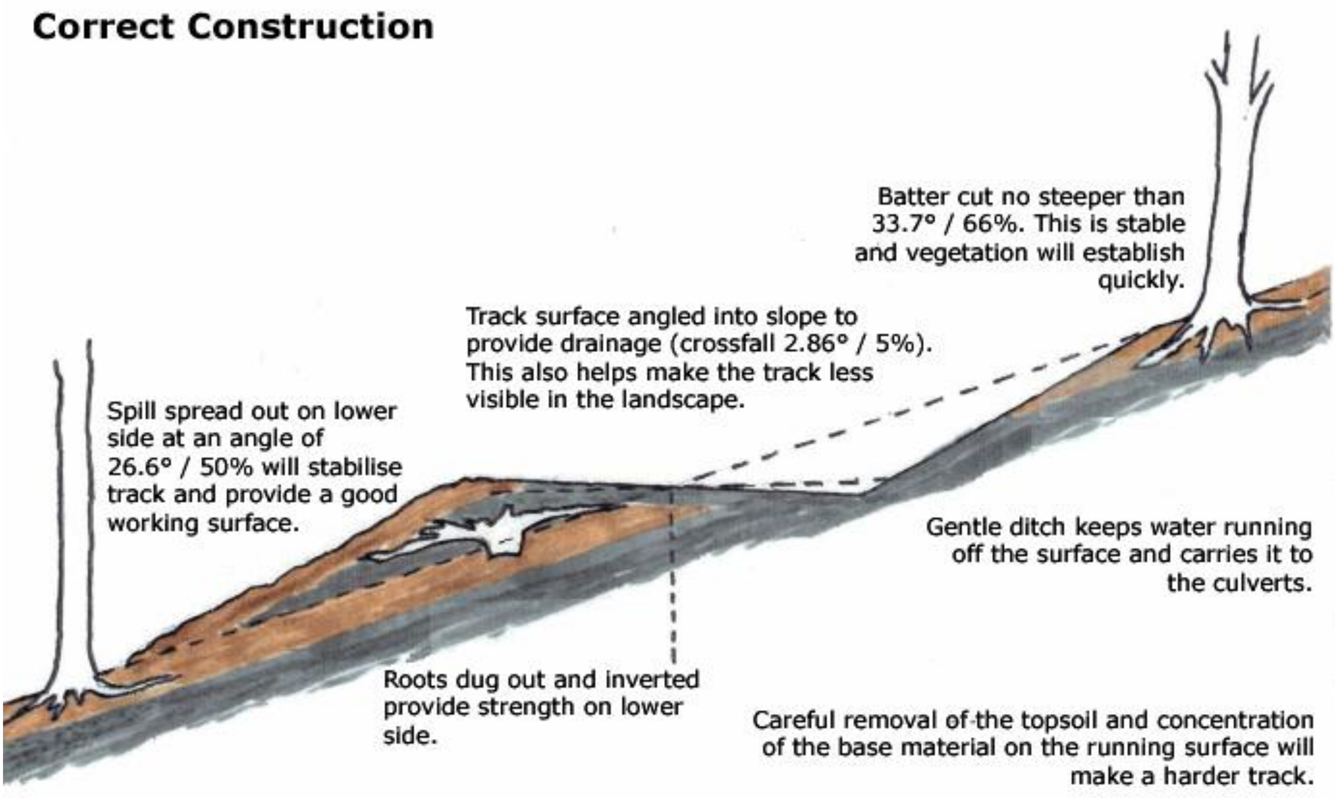
Working on side slopes

The machine needs to establish a level platform to work on. The formation cut should be done with a small bucket (45 cm wide) if stumps are large or there is some rock to cut. Good material from the cut should be used to fill under the running surface: see figure 6. Loose material such as top soil should be pushed to one side. Tree stumps must be dug out and inverted, making a hole for them if necessary. The batter should also be cut at this stage but roughly.

Figure 6 shows a track being cut through a brown earth site overlying shale which is good enough to be used to make the running surface. In places where the topsoil is deeper, you can move the track towards the bank in order to access more shale or cut the track a little deeper. Alternatively you may be able to "win" stone from other sections of track in order to metal sections where there is less. Once the formation cut has been made, a 2 metre wide bucket should be used to finish off the batters and spill to leave smooth slopes which will consolidate more quickly and tidily than rough faces.

Figure 6 Cross sections of track built on a 30% cross slope





Tracks and roads on thick clay

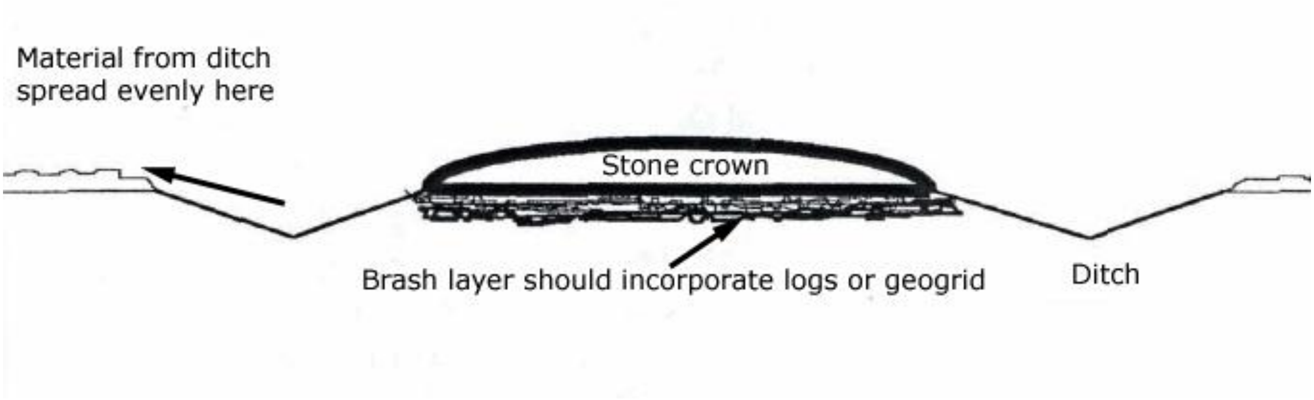
Thick clay is one of the most difficult types of ground on which to construct access routes. Never use wheeled machinery for formation work on clay as it may sink and create huge ruts. A tracked excavator is essential but only the minimum of cutting should take place, (but you must still remove stumps.) Remember that you are not expecting to win stone from lower down as with shale. Instead, once the formation cut is made, you will need to bring in high quality stone to make the running surface strong and prevent the rain penetrating to the clay underneath.

Stone needs to be carefully specified and laid in layers. The first needs to be fine to "bind" the clay before larger material is added to build strength. A finer top layer is then needed to seal the surface well. ''Blinding" the clay will prevent larger stones penetrating into the clay which would weaken the road and lead to rutting. Consider the use of a geofabric as a separation layer.

Tracks and roads over deep peat

Deep peat is usually level and therefore a track should be built in a similar way to a forest road with a crown that drains water both ways. This will make the track more stable. Utilizing vegetation and brash will help to reduce the amount of stone needed, see table 4. Sitka spruce brash is ideal for this, particularly if long tops are laid across the track in what is often called "corduroy" style. Large amounts of fresh, springy brash are needed in order to establish a thick mat as it will compress down to a remarkably thin layer, for example a 2 metre pile of fresh, loose brash will compress to form a mat as little as 30cm thick. If cutting a new road line through a crop, incorporate all the brash from the trees felled to make the formation cut, as well as the upturned root plates of trees. Figure 7 shows how a road or track over peat needs to sit on top of the peat like a stable raft.

Figure 7 - Track over deep peat



Consult with an engineer for best designs for tracks over peat.

BWW forest tracks specification

The following specification applies to all tracks, basic and stoned, grant aided under BWW.

There are three general types of tracks that fall within the scope of BWW:

1. ATV Tracks – for deer management access or operational access on sensitive sites where very limited amounts of material will be extracted. Running width = 2.0 – 2.5 metres.
2. Tractor Tracks – for operational access by skidders, tractor based forwarders and 4x4 vehicles in smaller and steeper woodland. Running width = 3.0 – 3.5 metres widening to 4.0m on bends with a minimum radius of 6.0m and 5.0m winching points for skidders.
3. Forwarder Tracks – for operational access by purpose built forwarders and larger forestry tractors for extracting large volumes of timber. Running width = 4.0 metres widening to 5.0m on bends with a minimum radius of 8.0m and 5.0m for winching points for skidders.

In addition, turning and stacking areas and transfer points are funded where there is an operational need and where they complement any new or existing track networks as described above.

Standard specification:

Minimum track width	As per above guidance.
Felled width	This will vary depending on the type of track and site, guideline of maybe up to 15 – 20 metres for forwarder tracks down to 3.0m for ATV tracks. Will be much less if the track is to be a basic type rather than stoned.
Cutting	The surface vegetation and topsoil should be removed prior to laying any material unless on a peat soil type.
Gradient	Maximum 11° / 20% (over 6° / 10% will require 'grips' and improved water control).
Stone depth	Range 50mm (for upgrades) – 350mm depending on type of ground and intended use of track (refer to Table 4).
Stone type	Type 1 (37mm diameter down to dust) and Type 2 (18mm diameter to dust).
Membrane	Use of a geogrid is preferred on peat, recommended on heavy clay soils and may be used in other situations where appropriate due to waterlogging or site sensitivity. However manufacturers' guidelines must be followed and the correct sized stone used. A geotextile membrane may also be used.
Cross slope (crossfall)	2.5° / 4.5% minimum - 5° / 8% maximum.
Side ditching	Should be appropriate to the track type and site.
Culverts crossing existing watercourses	450mm minimum up to 1500mm diameter. (Use of culverts smaller than 450mm must be agreed with the woodland officer).

Work specified must be fit for the purpose intended. Any significant under or over specification will be identified by the woodland officer at the approval stage.

Further considerations by woodland officers when assessing a track will be:

i. environmental impact including water, landscape, ecology and social aspects (normally considered through an Environmental Impact Assessment (EIA) determination).
ii. value for money.
iii. safety, that is, whether or not the track provides a safe working location.

Planners should insert a specification to the application in the description box in the operations screen based on the following:

Woodland Access Tracks IN17

Contract Text Specification:

The track is to be constructed as/upgraded to a basic/stoned ATV/tractor/forwarder track. Running width will be XX metres with a felled width of XX metres. Track gradient will be between 2% to 20% (over 10% will require 'grips') with a crossfall of between 4.5% to 8%. Stone depth will be a minimum of XX mm using XXXXX stone with a geotextile membrane. A minimum of XX cross drains of XXX mm diameter will be installed at a maximum spacing of XX m along the track length.

Delete/Insert XXX as appropriate.

Refer to current business rules.

Useful References

Technical guidance

- Unsurfaced roads in the rural environment Inst. of Agricultural Engineers 1984 Conf.
- Forests and Water Guidelines 3rd edition or later (current edition)
- Forest Enterprise Wales Harvesting manual 2nd edition
- Forest Research TDB Technical Note 27/98 Access Track Construction in Small Woodlands, (case studies of 5 different track projects with costings.)