



3.2.6 PURCHASE OPTIONS

What you should do before making a decision

Assuming that you have made a decision to irrigate your property (see Section 3.1.1), there are a number of steps that you should take to ensure that you make the best decision regarding how you will irrigate and who is going to supply and install the system.

Timing

Give yourself plenty of time to plan, arrange, design and install your scheme – preferably 12 months. It can be done in less time than this, but usually a development programme planned in haste will have some inadequacies unless the farmer doing the project has previous irrigation experience. You are dealing with a very expensive project, both on a per hectare basis and in total, so you need plenty of time to consider the options.

Spray irrigation systems can be installed in a relatively short time once the design and layout plan has been established and approved. The exception to this is where irrigation machinery or pumps are not held in stock in New Zealand and have to be imported. Border-strip irrigation systems are usually established progressively over several years.

Water source

Ensure that you will have access to the required amount of water. You must ensure that you can physically access the water you need or at least have a high probability of doing so, and that you can obtain resource consents to take the water.

Given the environmental issues associated with taking water for irrigation, it is prudent to obtain resource consents to take water *before* committing to irrigation development. In most cases, obtaining consents to take water will be relatively straight-forward, but you should allow at least six months, possibly longer in some areas, to go through the process. There is no guarantee that you will get the water you need under favourable conditions.

Observe existing equipment

The more ideas that can be contributed in terms of the final design and layout, the better the final result will be. Although you may have preconceived ideas about what you want, be open-minded. Often, the type of system you had in mind may not be the best in terms of overall performance and profitability.

Visit other irrigation farmers in your district to find out what has worked and what hasn't. Ask lots of questions of people with both recent and long-term experience of irrigation. This may save you a lot of time and money.

When talking to existing users of irrigation equipment, be aware that you may not always get an honest opinion. Purchasers of expensive equipment are often unwilling to discuss negatives about the equipment. You are likely to receive a biased opinion rather than an honest one. It is best to try to observe different systems when they are operating and assess them under the various headings described in Section 3.2.1.

Talk to independent experts

Discuss your ideas with an experienced and skilled farm advisor and with an independent irrigation engineer. These experts should be able to guide you in the right direction and ensure that you have given necessary consideration to all of the relevant factors.

They should also be able to suggest which irrigation equipment suppliers you should talk to and obtain a quote from.

Visit irrigation equipment suppliers

Remember that all irrigation equipment suppliers have a vested interest in selling you the equipment. But it is very useful to talk to suppliers as they generally have extensive experience in designing and supplying their type of systems. They will probably also comment on opposition products, usually pointing out why their product is better. This can be useful when visiting opposition companies as you can ask specific questions about these differences and make up your own mind.

Initial contact is usually through a telephone call or a visit to their offices. The discussion can take place in their office or on your property. It is recommended that you take a farm plan with you.

Who is going to design the system

There are two alternatives for getting a system designed.

The most usual is to approach irrigation equipment suppliers for quotes. The initial discussions or visits you have had will give you a good idea of who to follow up for quotes. It is wise to obtain a minimum of two and preferably three quotes. Although more than three can be obtained, this is usually only of limited benefit if you have previously investigated the options most likely to be suitable. Most equipment suppliers have the necessary in-house expertise to design irrigation systems. Where systems are particularly complex hydraulically, such as those that have multiple pumps, they may obtain the advice of an experienced specialist engineer.

The alternative is to employ an independent consultant to design the system for you. You should then have a plan and “shopping list” that you can use to approach equipment system suppliers for prices. In theory, this may appear to be the preferred approach, but be aware that someone needs to take responsibility for the system. This can lead to difficulties if problems occur and there can be disagreement about whether a problem is a “design” problem or an “equipment” problem. If you are using an independent consultant, be sure to resolve issues of responsibility before you start.

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Getting the system designed

Regardless of whether you get the system designed by an irrigation equipment supplier or by an independent consultant, there are some basic concepts that should be adopted.

Make use of as many hours in the day as possible

The most cost-effective design for most spray irrigation systems is to retain the water within pipes once it is captured and to use that water for as many hours in the day as possible. When all factors are considered, it is rare to find systems designed to operate only on night-rate electricity which work out cheaper than systems designed to operate 24 hours per day.

Where shifting of irrigation machinery is involved, plan to shift after 24 (or 23) hours and only use 12 hours if necessary. Avoid shifting at odd times of the day or night – that is hard on everybody. Shifting once daily does not necessarily mean that the irrigators will run for 24 hours. In the beginning and end of the season, they may run for fewer hours per day but still be shifted at the same time each day. Be careful that systems designed for 24 hour shifts do not apply more water than the soil can hold over that time.

Aim for overall efficiency

Aim for an effective and efficient system. Remember that efficiency encompasses a number of factors such as water use, labour, energy and capital. All must be considered. Don't under-design. Too many schemes are designed to a price rather than to what is needed to maximise production and profit. Annual interest costs are often cheaper than ongoing labour costs and inefficiencies that create additional costs.

Put your money into things in the ground

Don't skimp on money spent on pipe, fittings, wells and other water distribution components. These items not only form the backbone of the system, they also have a very long life and are most difficult to change.

If there is a choice between spending a little more to install a larger pipe size and using a smaller pipe size that may be borderline in performance, choose the larger size. It will usually reduce the overall annual costs of operating the system.

Design the farm around the irrigation system

Don't design the irrigation system around the existing farm layout. Ignore as many as possible of the existing farm physical structures, including fences, lanes, shelter trees, even hay barns and other buildings. It is much better to move items such as buildings, access roads and fences to create a more efficient system rather than compromise in the design stages and end up with a scheme that is more difficult, time consuming and frustrating to operate. Remember that you only move fences once. You have to operate the irrigation system for many years.

Unfortunately, schemes every year are being designed around existing farm layouts, and these are costly to install, with more pipe usually necessary. They are certainly a lot more difficult to operate because of the variations in run length, paddock sizes, hydrant sizes and hydraulic specifications.

If you are redesigning a farm underground mainline system, it is certainly possible to dig up existing mainline if it is PVC pipe. It is not so easy, and not recommended for fibrolite or asbestos-cement pipes, but remember that the need to improve the overall scheme design and layout can have a significant impact on ongoing annual operating costs. Usually, capital is a better substitute for labour long-term.

Make it easy to operate

When using spray irrigation, consider irrigators that are easy and simple to operate. They should be easy to move within a paddock or to adjoining or more distant paddocks. This will depend on the contour of the farm and access lanes between various parts of the farm.

Watch out for problems associated with moving under or around power lines, also hedges, buildings and other

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obstacles that may present significant risk or time delays in shifting. Also, with power lines, be aware that big guns fired onto power lines can push the lines together causing shorting. It may be necessary to move the central wire to a higher level to stop shorting.

Aim for a constant run length and paddock size for easier management, particularly delegated management. That is where starting from a bare block can have its greatest advantages.

Don't stretch irrigation runs too far. Very long runs usually put too much stress on irrigators and hoses and on the tractor/anchor or other features of the property.

Have irrigation runs parallel to the road rather than at right-angles if possible. It will give more end coverage and reduce the risks of throwing water across roads creating traffic hazards.

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What should an irrigation quote include?

Irrigation quotes range from verbal agreements to “put in an irrigation system”, to rough sketches on bits of paper, through to more detailed plans and materials lists.

Today, the value of irrigation systems can range from a few thousand dollars to millions of dollars. Regardless of the size of job, the system should be properly specified and quoted.

Some companies may justify a poorly specified quote because they don't want you to shop around with their design if they give you all of the details. However, these companies often don't give you a detailed quote even if you agree to buy the system from them.

There is some justification for a particular supplier not wanting to provide a shopping list. Some have suffered because of that in the past. But it is difficult to properly compare quotes unless full details are given. Some companies will now charge you a fee for the design and if you purchase the system from them, they will refund the design fee.

Today, many irrigation companies are preparing comprehensive and detailed designs that include major components fully specified with clear and concise computer-generated plans. In a few cases, comparative annual costs of various design options and justification for choice of design options are given.

On large systems, irrigation companies may be asked to make presentations on their designs to owners or owner representatives. This gives each company the opportunity to discuss their design and gives the purchasers the opportunity to ask questions and to ensure that the system will meet their requirements.

When things go wrong, independent experts are often called in to try to find out what went wrong, why and who was responsible. In most cases, the biggest problem is that systems have not been properly specified and it is difficult to find out whether the original specification was wrong or something else was wrong.

A properly prepared quote giving detailed specifications is a must for your protection. It is very unwise to accept a quote if this is not done.

What should quotes contain?

A well-presented quote should contain a technical summary, a fully-priced bill of materials and a well presented plan, preferably in A3 size or larger. The technical summary should include the following where applicable:

- name of owner and location of the property
- the area of the property and the area irrigated within that property
- the design capacity of the system and perhaps justification for that capacity
- description of soils on the property
- description of water supply and any limitations of the supply
- the type(s) of irrigation system proposed and the areas covered
- application depths and return intervals for the system
- application rates and how they relate to soil infiltration rates
- pressure losses and requirements for major components in the system
- pump duties
- pump efficiencies and power requirements
- an assessment of annual operating costs
- an assessment of typical labour and maintenance requirements.

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The bill of materials should include (with prices):

- lengths and diameters of each pipe type used in the design
- number and description of valves/hydrants and other components
- an allowance for fittings costs
- pumps
- pump cables
- pump columns
- pump electrics
- pump sheds
- irrigator/emitter description and costs
- irrigator drag hoses if applicable
- installation costs
- control systems
- delivery times
- payment terms
- dates for commissioning
- guarantees
- what happens with adjustments/extras
- exchange rates where equipment is imported.

Plans should be to scale and where applicable, contain:

- name and address of designer
- scale
- date designed/drawn
- clearly defined property boundaries
- north symbol
- areas irrigated
- irrigator lanes or irrigated blocks
- water supply positions
- headworks components
- pipe positions and sizes (labelled or with colour key)
- valve positions and sizes
- installation details.

The information included in the technical summary and the plan should be in sufficient detail to enable you to determine exactly what you are going to get for your money. Following installation, an as-built plan and summary should be provided to enable anyone to determine what has been installed, where and in what configuration. This is particularly important to resolve problems or when changes in personnel occur.

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Design audits

Independent checking and auditing of design proposals is generally advised on medium to large irrigation proposals, although small systems may also benefit from an independent appraisal. A qualified and experienced professional irrigation consultant should be engaged to carry out the audits.

It is advisable to get an assessment before commencing a project or before finalising the design and final cost. Irrigation firms themselves can also do an assessment, but most of them have a vested interest in terms of selling their own plant and equipment.

Advantages of audits

- You can have confidence that the system you choose is the best one for your situation.
- An independent evaluation of the pros and cons of each design proposal can be given.
- The cost of correcting mistakes or improving systems is easy at the design stage.
- A more efficient system can be achieved.
- A technical comparison of the different features can be made.
- The system proposals can be checked to ensure they are able to meet the specified performance.
- Detailed hydraulic analysis can determine if the system will work to specification.
- Limitations or possible problems in the system can be identified.
- Annual capital and operating costs can be assessed.
- Audit reports can add strength to loan applications or resource consent applications.
- A reduction in the cost of the system is often possible.

Disadvantages of audits

- A small fee will be charged for the service.
- In some cases, advice may be given to make changes that result in higher initial cost.
- It may be difficult finding someone who is independent and who has the necessary skills, and training to carry out the audit.

Precautions

- Don't expect the expert to make the final decision for you. It would be wise to act on their advice but the final decision is ultimately yours.
- Try to check out the reputation of the person that you engage to do the audit. Talk to your general farm advisor or other farmers about who to contact.
- Ask for an idea of the likely cost of the audit and what you will receive for your money.

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Installation, testing and commissioning

Even when a system is correctly designed, it is not going to perform to specification if it is not properly installed, tested and commissioned. The quality of an irrigation design can quickly be compromised by poor installation. Do not underestimate the importance of getting the installation right.

Installation

There are three choices with installation of irrigation systems:

- Do the installation yourself.
- Do some of the installation and contract out the rest.
- Contract out the installation.

Installation requires skills, experience and equipment. The main reason most people want to be involved in the installation is to save money. Whether that is possible depends on the type of system. Centre-pivot installation requires specialists, while K Line, for example, is simple enough for most practically minded farmers to install themselves.

When installing an irrigation system there are a few things you need to be aware of:

1. Be clear about who is responsible if things go wrong. If a supplier or contractor is carrying out the installation, they are normally responsible for ensuring that the system performs to specification. If you are doing part or all of the installation, the issue of responsibility can become blurred.
2. Make sure measurements and details on the plan match what is actually in the field. Many designs are now planned from aerial photographs with a reasonable degree of accuracy. GPS systems are also now being used to identify various points on a farm and help design an accurate layout and plan.
3. The mainline layout and key locations of hydrants and lane spacing, where appropriate, need to be checked on the ground before installation.
4. Install the mainline before the establishment of cash crops, if possible, so that the crop is not damaged. Mainlines may be installed using a grader or backhoe. With a grader, more soil is shifted, but the job is generally cheaper. Mainline thrust blocks should be installed, as without them, you may experience significant problems with blowouts. Watch out for stones and their effect on the mainline during mainline installation. Ideally, stone-free soil should be packed

around the mainline. Have the mainline well below cultivation depth. It may be better to cut fences and re-strain them after the mainline has been installed, rather than trying to establish the mainline system under existing fences. In any event, all or most of the fences may need to be removed as part of the irrigation scheme plan.

5. All materials should be installed in accordance with the manufacturer's instructions.
6. For travelling irrigator systems, permanent anchors are usually recommended to obtain accurate lane spacing. These may be wooden posts concreted in or two-metre lengths of railway irons driven into the ground. The railway irons may also need to be concreted in, depending on soil type.
7. Be aware that the initial lane spacing may not be ideal. It usually takes one irrigation season to refine lane spacing and to find out if anchor points are in the right places. It is a good idea to use low-value tractors as anchors until lane spacing is finalised, but then install permanent anchors, as tractors can be hard to start when wet and also do not have the ability to hold the high pulling power of the larger irrigators.
8. Installation of pumps, particularly submersible pumps, is almost always carried out by qualified pump specialists or well drillers. Installation of pump electrics must be carried out by a qualified electrician. Make sure that protection devices such as pressure switches are installed and set at the correct levels.

Testing and commissioning

If a contractor or supplier has installed the irrigation system, they are usually responsible for testing the system and ensuring it works to specification. Small teething problems often occur in the initial stages, so be sure that the contractor returns to fix them as soon as is practically possible. Do not accept anything less.

If you install the system yourself, obtain instructions from the equipment

suppliers on how to start the system. Flush out all pipelines to clear any sand or debris from the system before connecting up irrigators, sprinkler or dripper laterals. Flush out irrigators, particularly centre pivots, lateral moves, K Lines and horticultural blocks before pressurising the system. This initial testing will also identify major leaks that can occur under low pressure.

When you are sure that the system is clean, close off the flushing points and operate the system at normal operating pressures.

You will also need to test the operation of safety cutout devices such as pressure switches to ensure that the system will stop if a failure or operational error occurs. Pump and electrical contractors should be present during testing.

Test the output from sprinklers or drippers at several locations throughout the system. For larger sprinkler systems, raingauges are a good way of checking the depth of water applied. Use a graduated flask or container of known volume to check the output of small sprinklers or drippers.

Make sure that the equipment supplier provides you with full operating and maintenance instructions for your system.

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