

Sewer Mining

How to set up a sewer mining scheme

With a growing population and highly variable rainfall over the catchments, water recycling is making an increasingly important contribution to our water resources.

Using recycled water for non-drinking purposes makes the drinking water supply go further and can help delay the need to invest in new infrastructure.

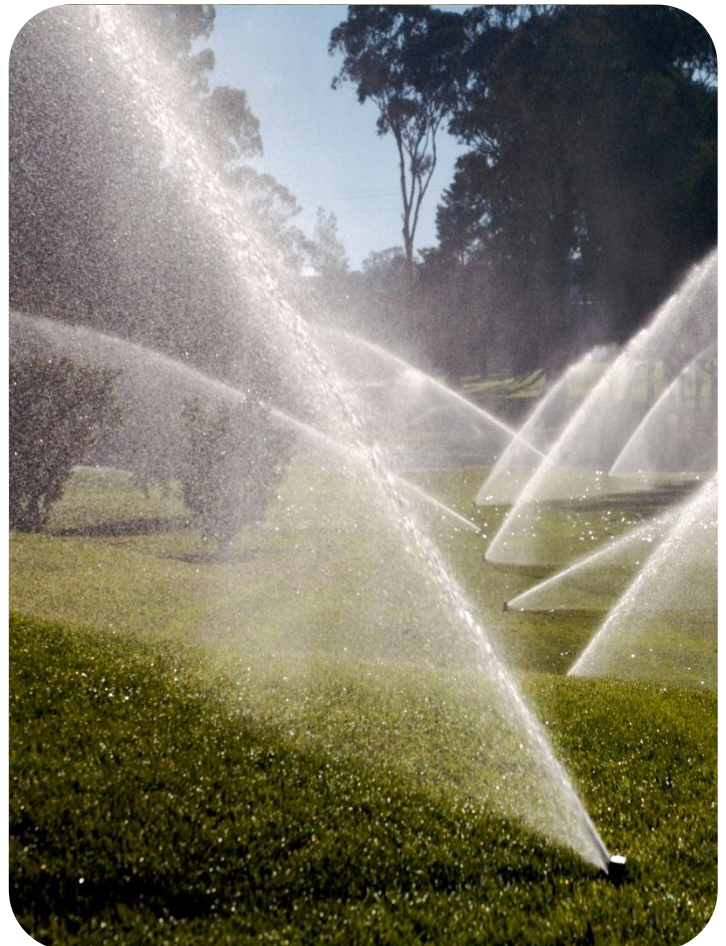
Sewer mining is one of the many ways the NSW Government is securing our water supply for our growing population.

What is sewer mining?

Sewer mining is the process of tapping into a wastewater system, (either before or after the wastewater treatment plant), and extracting wastewater, which is then treated and used as recycled water. Some sewer mining by-products may be acceptable for return to the wastewater system under a *Consent to Discharge Industrial Trade Wastewater*.

Recycled water is treated so it's safe to use. Recycled water produced from a sewer mining operation is commonly used in some commercial buildings and industrial sites for toilet flushing and in cooling towers.

Recycled water from sewer mining is also being used to irrigate sports fields, parks and golf courses.



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Sewer mining schemes in Sydney

The NSW Government's Metropolitan Water Plan encourages the private sector to implement innovative solutions to secure Sydney's water supply, particularly by recycling.

Sydney Olympic Park

The Sydney Olympic Park Authority's Water Reclamation and Management Scheme at Homebush Bay was Australia's first large scale urban recycling scheme to source wastewater through sewer mining for irrigation and residential non-drinking uses. Recycled water replaces 50% of the drinking water that would otherwise be used at Sydney Olympic Park and Newington Estate.

Pennant Hills Golf Club

Pennant Hills Golf Club's Water Reclamation Plant produces up to 100 million litres of recycled water each year to irrigate the golf course. This sewer mining project was the first of its kind for a privately run golf club in Australia. Previously, the course relied on drinking water for irrigation.

Workplace 6

Workplace 6, located on Darling Island in Sydney, is the first commercial development in NSW targeting a six-star Green Star energy rating. The environmentally sustainable six-storey office building has an on-site sewer mining facility that is able to produce up to 14 million litres of recycled water each year for toilet flushing and irrigation of two adjoining parks.

The number of sewer mining projects is constantly growing. For an up-to-date list, visit www.waterforlife.nsw.gov.au/recycling.

Benefits of sewer mining

- Reduces the demand for drinking water by replacing it with recycled water.
- Reduces stress on waterways by capturing some of the nutrients that would otherwise be discharged from wastewater treatment plants.
- Enables users to access an alternative source of water where reticulated recycled water is not available.
- Encourages competition in the water industry, with opportunities for private sector involvement.
- Increases potential for 'green space' areas in commercial developments, due to the benefit of being able to use recycled water for irrigation.



Recycled water from sewer mining can be used to irrigate sports fields

Sewer mining schemes

Sewer mining schemes can be large or small. A sewer mining scheme consists of a:

- connection to Sydney Water's wastewater system to extract wastewater
- network of pipes to transport wastewater from the extraction point to the treatment site
- wastewater treatment plant that produces recycled water that is suitable and safe for its permitted use
- network of pipes for distributing recycled water
- system to manage by-products produced in the sewer mining facility.

The scheme may also include a discharge connection to return approved residuals back to Sydney Water's wastewater system.

There are various types of treatment technologies available to treat wastewater obtained from sewer mining. Wastewater treatment will generate:

- recycled water suitable for a particular use
- grit and screenings
- other residuals, including a more concentrated version of the extracted wastewater which may contain treatment additives.

Before constructing a sewer mining scheme, decisions need to be made about how the recycled water will be distributed and the remaining waste managed.

Guidelines and requirements

Recycled water produced from wastewater must be treated according to public health and environmental standards and water quality requirements. Guidelines include the *Australian Guidelines for Water Recycling 2006* and the *Interim NSW Guidelines for Management of Private Recycled Water Schemes*.

Sydney Water also has a *Sewer Mining Agreement* for sewer miners that set out the conditions, use and management of wastewater from Sydney Water's wastewater network.

What is the impact of the Water Industry Competition Act 2006?

The *Water Industry Competition Act 2006* and the regulations supporting it commenced in August 2008. Its objectives are to encourage competition in the water industry and to foster innovative recycling projects and efficiency in the provision of water and wastewater services.

You may need to be licensed under the Act if you want to supply recycled water obtained from sewer mining to other parties, or to access a wastewater pipe that is not on your property.

Discharge of waste and by-products

Most sewer mining schemes will involve extracting wastewater directly from a Sydney Water wastewater network pipe.

The sewer miner will need to measure the quality and quantity of wastewater extracted from the wastewater system and the quality and quantity of any waste and by-products returned back to the system. Sydney Water will only charge for the additional load of substances discharged back to the wastewater system, which may include treatment additives such as iron, aluminium and sulphate.

Discharges to the wastewater system from a sewer mining operation must meet Sydney Water's acceptance standards. These conditions apply even when there has been no overall increase in the load of a substance to the wastewater system. This information is available at sydneywater.com.au.

Discharge standards and requirements

The acceptance standard for suspended solids returned will be determined by the capacity of the receiving wastewater system directly downstream of the connection point. This means that the acceptance standard concentration of 600 milligrams per litre (mg/L) for suspended solids must be achieved after mixing with flows in the receiving wastewater system - measured by analysis of a composite sample over a typical 24-hour period.

Gross solids or grit will not be accepted back into the wastewater system. However, macerated screenings may be returned, provided the acceptance standard concentration of 600 mg/L in the receiving wastewater system is not exceeded.

The extraction point should be designed to minimise the collection of grit from the wastewater system.

Sewer mining exclusion zones

Anyone can apply to Sydney Water for sewer mining approval. There are general requirements that outline what is needed for most sewer mining schemes.

Some areas of the wastewater system are closed to sewer mining. This may be because there is other sewer mining or recycling schemes already in place and there is no further wastewater available for sewer mining. Other areas of the wastewater system may have insufficient wastewater available to accommodate any sewer mining schemes at all.

More information about exclusion zones is available at sydneywater.com.au.

Assessment and approval of new sewer mining schemes

To secure Sydney's water supply, safeguard public health, protect the environment, and maintain wastewater system operations, a number of government agencies play a role in regulating or assessing sewer mining schemes.

Agency	Role
NSW Government	Provides the <i>Metropolitan Water Plan</i> as the strategic context for initiatives to secure Sydney's water supply.
Local councils	Approve the installation, operation and maintenance of privately operated recycled water schemes under Section 68 of the <i>Local Government Act 1993</i> .
NSW Office of Environment and Heritage (OEH)	<p>Advises local councils and customers about requirements to operate and maintain sewer mining schemes, recycled water quality and how to protect the environment in accordance with the <i>Interim NSW Guidelines for Management of Private Recycled Water Schemes</i>.</p> <p>Sewer mining proposals from local government require approval from OEH (Office of Water) under Section 60 of the <i>Local Government Act 1993</i>.</p> <p>Also administers the <i>Protection of the Environment Operations Act 1997</i> (POEO Act). The POEO Act requires environment protection licences for certain activities, though these licences are generally not required for sewer mining schemes.</p>
Sydney Water	Manages agreements with sewer miners to construct, operate and maintain sewer mining connections and return waste to its wastewater system.
NSW Health	Advises local councils on water quality requirements related to public health for sewer mining schemes, (for processing Section 68 approvals).
The Independent Pricing and Regulatory Tribunal (IPART)	<p>Regulates and periodically reviews Sydney Water prices.</p> <p>Processes applications for licences and arbitrates disputes under the <i>Water Industry Competition Act 2006</i> where they cannot be resolved between parties.</p>

Setting up a sewer mining scheme

To set up a sewer mining scheme, you will require approvals from Sydney Water, your local council, and in some cases, the NSW Office of Environment and Heritage (OEH). You may also need to consult with IPART, and apply for a licence under the *Water Industry Competition Act 2006 (WICA)*.

Applying to Sydney Water for sewer mining approval is a detailed process. It involves preliminary discussions, initial development approval and construction approval. Completing a thorough investigation and concept review before making a formal application ensures you will have all the necessary information for Sydney Water to properly assess your application.

For information on how to contact Sydney Water, see the 'To know more' section of this fact sheet.

After all approvals have been obtained and a *Sewer Mining Agreement* has been signed, you will be able to start constructing your scheme. When you build your sewer mining facility, Sydney Water and other agencies will ensure that it is built in line with the approved design and operates to agreed standards.

Sydney Water has a six-step sewer mining application process.

Step 1

Carry out preliminary investigations and obtain advice.

Step 2

Develop and review your concept plan and design.

Step 3

Decide whether to proceed.

Step 4

Obtain approvals from Sydney Water, the local council and other government agencies.

Apply for a WICA licence from IPART (if required).

Enter into a *Sewer Mining Agreement* with Sydney Water.

Step 5

Construct your on-site sewer mining facility and connect to Sydney Water's wastewater system.

Step 6

Commission and operate your sewer mining scheme.

Helpful tips for setting up a sewer mining scheme

- Integrating the design of your sewer mining plant with overall building design could save on servicing costs later on.
- Sampling the available wastewater will assist you in determining the most appropriate treatment process to use.
- Returning residuals back to the wastewater system requires detailed analysis and discussion with Sydney Water.
- Include emergency provisions for the sewer mining plant.
- Ensure that odour management is considered when designing how the scheme will operate.
- Water hammer and pressure fluctuations in the wastewater system need to be studied to avoid operational difficulties.
- Review Sydney Water's standard *Sewer Mining Agreement* to ensure you are happy with the conditions of the agreement. A copy of the standard agreement is available on Sydney Water's website.



The on-site sewer mining facility at Workplace 6 produces over 10 million litres of recycled water each year

Step 1 - Preliminary investigations and advice

Doing some research for your sewer mining scheme is the first step. Details you need to consider for your proposal include:

- how the recycled water will be used
- the volume of recycled water required for the proposed end use
- required extraction volumes
- the proposed wastewater treatment system
- the space required for your on-site sewer mining treatment facility
- likely costs and savings

Once you know what your needs are, Sydney Water and other relevant agencies can provide the right information and help you understand the requirements for your sewer mining scheme.

What do you need to do?

Submit a *Request for Preliminary Advice on Sewer Mining Proposal* to Sydney Water, connections@sydneywater.com.au. This form is available on Sydney Water's website, sydneywater.com.au.

You should also seek relevant advice and information from:

- your local council
- NSW Office of Environment and Heritage (OEH)
- the Independent Pricing and Regulatory Tribunal (IPART)
- NSW Health
- treatment technology suppliers
- water recycling consultants
- your financial and legal advisors.

Consult with NSW Health

Discuss your sewer mining scheme with NSW Health and obtain advice about:

- water quality requirements related to public health, for the suitable uses of recycled water from sewer mining schemes
- required treatment of the collected wastewater to standards set by NSW Health, depending on how the recycled water will be used.

What Sydney Water will do

Once we have received your proposal, we will provide information on whether or not there are any constraints that will affect your sewer mining scheme.

If there are no issues that prevent your scheme from proceeding, we will provide:

- the location of nearby wastewater network pipes
- possible connection point locations
- modelled wastewater flow rates and daily flow patterns (where available)
- the types of customers upstream in the sewer catchment
- Sydney Water's existing obligations to other sewer miners downstream in the wastewater system and existing commitments to maintain downstream wastewater flows
- your obligations under Sydney Water's *Responsibilities of Connected Customers Policy*.

We will also provide you with:

- a copy of Sydney Water's standard *Sewer Mining Agreement* template
- Sydney Water staff contact details if you have any questions or need more information.

Why ask Sydney Water to review your sewer mining proposal?

Sydney Water will be able to give you general advice about what is needed for most sewer mining schemes. However, requirements may vary as each of Sydney Water's wastewater systems is different. Sewer mining schemes need to be assessed on a case-by-case basis.

There may be reasons why wastewater flows must remain in the system and are not available to extract for sewer mining. For example:

- Some sections of a wastewater network may need greater minimum flow than others to ensure safe operation of the wastewater system.
- There may be other sewer miners or recycling schemes downstream of where you are proposing to connect, which could be affected by your sewer mining scheme.
- If your connection point is quite close to a wastewater treatment plant, the level of suspended solids you can discharge will be lower than prescribed in the general specifications, as there would not be sufficient opportunity for your discharge to be diluted.

These constraints may affect the cost, design and feasibility of your proposed sewer mining scheme.

Step 2 - Develop and review your concept plan and design

Before you lodge your formal sewer mining application, it is a good idea to develop and review your proposed sewer mining concept plan and design with Sydney Water.

This will enable you to get general feedback, before paying for and lodging a full technical design. Sydney Water will check any required variations to the general technical parameters relating to the location of your proposed connection point.

At the end of this step, you should have all the information you need about:

- connecting to Sydney Water's wastewater network
- extracting wastewater from Sydney Water's system
- discharging waste and by-products from your sewer mining operation
- deciding if you want to proceed with sewer mining.

Please note that the feedback Sydney Water provides on your concept plan does not constitute an approval to connect to a Sydney Water asset.

What do you need to do?

- Develop a concept plan and design that details the proposed:
 - location of the extraction point
 - wastewater extraction volume
 - collection and treatment processes
 - discharge point
 - composition, volume and peak flow rates of suspended solids returned to the wastewater.

You should consider carrying out gauging of the sewer to analyse the flow patterns and quality of the available wastewater.

You may choose to engage consultants specialising in wastewater recycling to assist with your concept plan. You may also choose to involve a listed Water Servicing Coordinator (WSC) to help design your concept.

A list of WSC's can be found on Sydney Water's website at sydneywater.com.au.

- Give your concept plan and design to Sydney Water for initial feedback.

What Sydney Water will do

We will examine your sewer mining scheme concept plan and design and discuss it with you.

The aim is for Sydney Water to develop a thorough understanding of your project and help you develop a feasible proposal.

We will then send you a letter that outlines:

- feedback on your proposed concept plan and design
- any variations to the general technical parameters that apply to your concept plan and design
- possible modifications of your concept plan and design for you to consider.



Recycled water produced from sewer mining can be used in the cooling towers of commercial buildings

Step 3 - Decide whether to proceed

If you decide to go ahead with your sewer mining scheme, you will need to select a technology supplier and may need to engage a Water Servicing Coordinator (WSC).

What do you need to do?

- Select a listed Water Servicing Coordinator (WSC) to lodge your sewer mining scheme application (if we advise you to do this).
- Select a technology supplier for your on-site sewer mining facility.

When do you need a Water Servicing Coordinator (WSC)?

In most cases, a sewer mining scheme will need to be connected to a large wastewater pipe. Applications to connect to Sydney Water's large wastewater pipes must be made through a listed WSC.

A WSC can answer questions about your application process on behalf of Sydney Water. They can also facilitate the project management, design and construction of any required works.

A list of WSC's can be found on Sydney Water's website at sydneywater.com.au.

Step 4 - Obtain approvals

You will need to obtain approvals from Sydney Water and other government agencies. If required, you may also need to apply for a WICA licence from IPART.

What do you need to do?

Sydney Water approval to connect

You need to formally apply to Sydney Water to construct the connection and discharge point(s) for your sewer mining scheme.

You will need to:

- engage a licensed WSC to lodge your sewer mining application with Sydney Water
- lodge your completed *Application for Consent to Discharge Industrial Trade Wastewater*
- provide the necessary information to Sydney Water to finalise your *Sewer Mining Agreement*
- complete a risk assessment with relevant stakeholders to ensure that your design meets required guidelines for safe operation. You will need to consult with:
 - NSW Health
 - NSW Office of Environment and Heritage (OEH).

Council approval to install and operate

If you are a private sewer miner, you will need two approvals from your local council:

1. Approval to install the sewer mining facility.
2. Approval to operate the sewer mining facility and use the recycled water.

These approvals may be sought at the same time. You should refer to the *Interim NSW Guidelines for Management of Private Recycled Water Schemes* for information and templates to help you apply for these approvals.

For sewer mining schemes where local council is the applicant, the approving authority is the NSW Office of Environment and Heritage (OEH). An Environmental Impact Statement is required under the *Environmental Planning and Assessment Regulation 2000*, unless your scheme will supply recycled water solely for industrial use or if it treats less than 1,500 kilolitres of wastewater a day.

Obtain any licences required by IPART

Consult IPART and if required, formally apply for any licences required under the *Water Industry Competition Act 2006*. You may also need to get your own legal advice if applying for any required licences.

What Sydney Water will do

- Sydney Water will assess your sewer mining scheme after receiving your application.
- We will send you a *Letter of Approval* which outlines the conditions of approval for your connection to Sydney Water's wastewater system.
- We will also work with you to finalise your:
 - Developer Works Deed*** - this covers construction of the connection point and, discharge points.
 - Sewer Mining Agreement*** - this agreement outlines the terms and conditions of your sewer mining connection.
 - Application for Consent to Discharge Industrial Trade Wastewater*** - you are required to apply for a *Consent to Discharge Industrial Trade Wastewater* if you plan to discharge residuals to our wastewater system.

What is a Sewer Mining Agreement?

A *Sewer Mining Agreement* outlines the terms and conditions of your connection to Sydney Water's wastewater outline the rights and responsibilities of both Sydney Water and for your sewer mining scheme. These may include:

- any monitoring and sampling you are required to do
- your obligations to manage any activity on-site that might affect your connection to Sydney Water's wastewater system
- any restrictions on the quality or quantity of trade wastewater we will accept
- any specialised equipment required for your connection (including metering equipment, backflow prevention devices, or wastewater treatment equipment)
- providing Sydney Water staff with access to your site.

The agreement also includes contact details of both the site owner and Sydney Water representatives who manage your agreement. It also outlines who you should notify if something goes wrong, or if something threatens the quality of our water or wastewater.

When it is finalised, your *Sewer Mining Agreement* will be issued to you as an appendix in an *Additional Services Agreement*.

The *Additional Services Agreement* applies to services that aren't covered by Sydney Water's *Customer Contract*. It outlines the terms under which Sydney Water provides these additional services and your rights and obligations. More information about the *Additional Services Agreement* is available at sydneywater.com.au.

Step 5 - Construction and connection to Sydney Water's wastewater system

Once you have approval from Sydney Water, you can construct your sewer mining scheme in accordance with your approved design.

What do you need to do?

- Engage a constructor that is experienced in wastewater system work to construct your connection. Evidence of the constructor's experience must be provided to Sydney Water. A list of constructors can be found on Sydney Water's website at sydneywater.com.au.
- Engage the same or other contractors to construct your sewer mining facility.

What Sydney Water will do

- Confirm that your selected contractor can be used to construct your connection to our wastewater system, based on their experience in wastewater works.
- Inspect the completed construction work of your connection and discharge points.
- Approve your sewer mining scheme if it complies with the agreed design in your *Developer Works Deed*.
- Approve your *Application for Consent to Discharge Industrial Trade Wastewater*, where applicable, and provide you with your consent document.

Step 6 - Commission and operate your sewer mining scheme

Your approval to operate a sewer mining scheme will also include conditions imposed by your local council. You should only start using recycled water once your sewer mining scheme has been properly validated and verified and the results formally acknowledged by the approving local council.

What do you need to do?

- Ensure your sewer mining scheme is validated and achieves the agreed recycled water quality and discharges – as required by NSW Health, in the *Australian Guidelines for Water Recycling 2006* and the *Interim NSW Guidelines for Management of Private Recycled Water Schemes*.
- Once operational, your sewer mining scheme must be independently audited on a regular basis.
- It is your responsibility to monitor the operation and maintenance of your sewer mining scheme, in accordance with the conditions of approval for your scheme's operation.

What Sydney Water will do

- Monitor the operation of your connection and discharge points to our wastewater system.
- Monitor compliance with your *Consent to Discharge Industrial Trade Wastewater and Sewer Mining Agreement*.
- Initiate the renewal of your *Consent to Discharge Industrial Trade Wastewater and Sewer Mining Agreement* as required.

Understanding your sewer mining fees and charges

IPART regulates and periodically reviews Sydney Water prices. Currently, IPART has set the price for sewer mining at zero. This means that once your sewer mining facility is commissioned, Sydney Water will not charge you for the wastewater you extract from its system. However, you will need to pay regular fees if you require a *Consent to Discharge Industrial Trade Wastewater* for your scheme.

Sydney Water seeks no financial gain from sewer mining, but must recover any costs incurred in allowing your sewer mining connection and operation to its wastewater network. Any savings to Sydney Water will be reflected in our charges. As each sewer mining scheme is different, establishment charges are calculated on a case-by-case basis.

As part of the application process with Sydney Water, you will need to pay fees for your *Sewer Mining Application* and *Sewer Main Adjustment Application*. Details of Sydney Water's fees and charges are available at sydneywater.com.au. You will also need to cover any fees charged by other government agencies and service providers you employ. This may include your technology supplier, the WSC, financial and legal advisors.

Resolving disputes

Sydney Water aims to help and support you in achieving your sewer mining goal, while at the same time protecting our wastewater system, licence obligations and business risks.

Our *Sewer Mining Policy* outlines the overall principles, terms and conditions that apply to sewer miners connecting to Sydney Water's wastewater system.

Where possible, we will work with you to resolve any issues and negotiate with you where necessary.

If you can't resolve an issue with us to your satisfaction, you can refer the matter to IPART for independent dispute resolution and arbitration.

Disputes with other government agencies can be resolved through the individual agency's dispute resolution process.

Definitions

- **Recycled water** is produced by cleaning wastewater, stormwater or greywater to remove impurities. A series of treatment steps is used to clean and purify recycled water to a standard that is suitable and safe for its intended use.

For large scale recycling schemes, treated wastewater may be sourced from wastewater treatment plants. Wastewater that is sourced directly from the wastewater system is called 'sewer mining'.

- **Sewer mining** is the process of extracting wastewater from a wastewater system and treating it to produce recycled water for a specific end use.
- **Wastewater** is water that has been used previously. This includes water from households (blackwater and greywater) as well as water from industrial and commercial sites. The wastewater going to Sydney Water's treatment plants is about 99.8% water.

To know more

For more information about setting up a sewer mining scheme in the Sydney region, contact Sydney Water's Business Customer Services:

Call: 1300 985 227

Email: businesscustomers@sydneywater.com.au

Visit: sydneywater.com.au

NSW Office of Environment and Heritage (OEH)

Call: 9995 5000

Email: info@environment.nsw.gov.au

Visit: www.environment.nsw.gov.au

NSW Health

Call: 9391 9000

Visit: www.health.nsw.gov.au

Independent Pricing and Regulatory Tribunal (IPART)

Call: 9290 8400

Email: ipart@ipart.nsw.gov.au

Visit: www.ipart.nsw.gov.au