

ITEM 2. CHIPPENDALE LEAKY DRAINS SUSTAINABILITY PROJECT**FILE NO: S103139****SUMMARY**

On 23 June 2014, Council resolved to request that the Chief Executive Officer investigate the implementation of a leaky drains project across the suburb of Chippendale, including an assessment of the costs and benefits of providing a rate rebate to any property owner who installs and maintains the leaky drain.

This report discusses the findings of the investigation. The feasibility investigation report prepared by Reid Environmental is included at Attachment A.

Leaky drains are perforated pipes that allow water from roofs to drain into the soil of the nature strip between the footpath and the road. When installed and maintained correctly in suitable soils, leaky drains may reduce flows in stormwater drains and some of the pollution in stormwater runoff. Leaky drains contribute to maintaining green space, which improves visual amenity and aids in urban cooling. They may also reduce potable water demand if these areas were previously irrigated using potable water.

These outcomes are consistent with the objectives of the City's Decentralised Water Master Plan, which include reducing potable water demand through efficiency and recycled water use, as well as reducing pollution discharged to local waterways via stormwater run-off. The City is implementing a number of initiatives to achieve these objectives including installation of stormwater harvesting systems, gross pollutant traps, raingardens, swales and wetlands in the public domain, as well as mandating water sensitive urban design in private developments.

The investigation evaluated the feasibility of leaky drains within the context of a trial in the Chippendale area. While the installation of leaky drains has merit in some areas, the investigation indicates it is not appropriate in Chippendale for the following reasons:

- the Chippendale area consists of impermeable clays and fills not suitable for infiltration. Increased water from leaky drains may damage underground infrastructure and exacerbate rising damp problems in Chippendale, where many buildings have deep foundations and underground rooms and car parks built close or up to the property boundary. Due to the slow rate of infiltration in clay soils and their shrink/swell properties, there is also a risk of water getting under the roads and weakening the pavement, causing potholes;
- the volume of water likely to be diverted by leaky drains in Chippendale is considered to be less than stated in Council's resolution of 23 June 2014. Leaky drains would have relatively little impact on the size and frequency of local flooding. They would also have minimal impact on downstream stormwater water quality because they treat roof water, which is considered relatively clean in an urban environment. Intercepting runoff from the streets through raingardens is considered more effective at reducing stormwater pollution; and

- leaky drains would be prone to clogging with leaves and debris, tree root blockage and breakage, causing leaking, flooding, and potential damage to houses, the nature strip and the footpath. Maintenance would be the responsibility of residents as the City of Sydney does not maintain private stormwater pipes draining across footpaths and nature strips.

A rate rebate was considered and, while it may incentivise residents to carry out the required ongoing maintenance on leaky drains, a rate rebate would result in an administrative burden to the City of Sydney that significantly outweighs any associated benefits to the community. In addition, as the City of Sydney does not maintain private stormwater pipes draining across footpaths and nature strips, its stormwater management activities would not be reduced by the residents maintaining leaky drains.

The investigation also referred to alternative solutions to leaky drains that may be more appropriate in Chippendale within the geological limitations. These options could be investigated by property owners and include:

- small rainwater tanks within residents' properties to collect rainwater for irrigation purposes; and
- above ground planter beds connected to the downpipes for irrigation before overflowing to street drainage.

RECOMMENDATION

It is resolved that:

- (A) Council note the findings of the feasibility investigation as summarised in the subject report and detailed in Attachment A to the subject report;
- (B) Council not proceed with a leaky drains project across the suburb of Chippendale; and
- (C) due to the uncertainty and minimal size of the quantifiable benefits of leaky drains, Council not provide a rate rebate for the installation and ongoing maintenance of leaky drains within the City of Sydney.

ATTACHMENTS

Attachment A: Reid Environmental (2015) Chippendale Leaky Drains Feasibility Investigation

Attachment B: Resolution of Council – 23 June 2014

BACKGROUND

1. On 23 June 2014, Council resolved to request that the Chief Executive Officer investigate the implementation of a leaky drains project across the suburb of Chippendale, including an assessment of the costs and benefits of providing a rate rebate to any property owner who installs and maintains the leaky drain. A copy of Council's resolution of 23 June 2014 is provided at Attachment B.
2. The City engaged Reid Environmental to carry out a feasibility investigation on the implementation of a leaky drains project across the suburb of Chippendale. Reid Environmental met a representative of Sustainable Chippendale on site on 6 January 2015 as part of this investigation. The feasibility investigation report is included as Attachment A and key findings are presented in this report.

KEY FINDINGS OF THE FEASIBILITY INVESTIGATION**Potential Benefits of Leaky Drains**

3. Leaky drains are perforated pipes that allow water from roofs to drain into the soil of the nature strip between the footpath and the road. When correctly installed and maintained in areas with well-drained soils, they have the following advantages:
 - (a) diverting water into nature strips reduces the demand for irrigation, thus saving potable water;
 - (b) increasing water infiltration mimics previous hydrology and can reduce flows in stormwater drains and reduces some of the pollution in stormwater runoff;
 - (c) green nature strips along the footpaths in urbanised areas provide cooling and visual amenity;
 - (d) the systems can be installed relatively cheaply; and
 - (e) the community may embrace the idea and continue to maintain the drains.

Potential Issues associated with Leaky Drains

4. While it is acknowledged that there may be benefits associated with leaky drains, the following issues were also identified and discussed as part of the investigation:
 - (a) poor geological conditions in Chippendale;
 - (b) overstated stormwater infiltration volumes and pollution reduction benefits;
 - (c) understated installation costs; and
 - (d) maintenance and the feasibility of a rate rebate.

Poor Geological Conditions in Chippendale

5. While it is beneficial to encourage infiltration, the geological conditions need to be capable of accepting the flows and drain safely past existing infrastructure. The WSUD Technical Guidelines for Western Sydney (2004) state:

"Infiltration systems are generally not suitable in the following soil or terrain conditions:

- (a) loose sands or heavy clays;*
 - (b) exposed bedrock or shallow soils over rock or shale;*
 - (c) unengineered fill; and*
 - (d) in medium to heavy clays, infiltration systems should have clearance from the building line of 4 to 5 metres."*
6. Investigations highlight that the Chippendale area consists predominantly of impermeable clays and fills and is therefore not suitable for infiltration. Chippendale also has many buildings with deep foundations and underground rooms and carparks built close or up to the property boundary, and infiltration systems such as leaky drains are therefore not considered to be suitable.
 7. The increased water infiltration from leaky drains may damage underground infrastructure and exacerbate rising damp problems in Chippendale. Due to the slow rate of infiltration in clay soils and their shrink/swell properties, there is also a risk of water getting under the roads and weakening the pavement, causing potholes.

Overstated Stormwater Infiltration Volumes and Pollution Reduction Benefits

8. Investigations suggest that the volumes of runoff diverted from the existing leaky drains in Chippendale stated in Council's resolution have been overestimated and do not take into account high flows bypassing the pipes. The volume of stormwater likely to be diverted by these leaky drains have been modelled and found to be approximately one twentieth of the stated 4 million litres per year.
9. To achieve the stated 50 million litres per year infiltration, 5,000 roofs would need to be connected, which are not available in the suburb of Chippendale. Connecting larger roof areas would overwhelm the leaky drain by flowing straight through and require large infiltration systems that could not fit into the nature strips around Chippendale.
10. Roof water is one of the cleanest sources of water in the urban environment, especially when compared to road runoff. Accordingly, the water quality improvement from leaky drains should be considered relatively minimal. Intercepting runoff from the streets through raingardens is more effective at reducing stormwater pollution. The City's raingardens provide additional treatment and flow capacity and are specifically designed for their purpose and location.
11. Leaky drains, due to their minimal storage and infiltration capacity, would have a negligible impact on the frequent flooding.

Installation and Maintenance Costs

12. Council's resolution noted that approximately 20 leaky drains have been installed in Chippendale since 2008 at a cost of less than \$300. These installation costs only include the bulk purchase of materials, with labour and any tools and specialist equipment contributed for free by the Sustainable Chippendale members. They do not include the cost of road opening permits at \$240 each drain and the cost of insurances, both of which would apply to installation of leaky drains in the verge.
13. The proposed leaky drains project in Chippendale intends to contract a builder (pro-bono) to coordinate the works and manage site safety (particularly for working near the road), obtain the road opening permit, as well as provide public liability insurance cover for any volunteers and potential damage to property.
14. For the purpose of comparing the costs applicable to other suburbs without volunteer labour, the installation cost per leaky drain would consist of labour, materials, tools and equipment, a road opening permit, and insurances. Assuming two hours of labour per drain at \$90 per hour, \$15 for materials purchased in bulk and \$240 per road opening permit, the cost per drain would be \$435 excluding insurances and equipment hire.
15. Where the existing pipe is made from asbestos, installation of a leaky drain would require significant management expertise and, therefore, additional costs to ensure that work is carried out safely and materials are disposed of appropriately.
16. Leaky drains will be prone to clogging with leaves and debris, tree root blockage and breakage, causing leaking and flooding and potential damage to houses, the nature strip and the footpath.
17. Ongoing maintenance will be required by residents as the City of Sydney does not maintain private stormwater pipes draining across footpaths and nature strips. Involving the community may be an effective and sustainable method to ensure long-term maintenance.

Feasibility of a Rate Rebate

18. Administering a rate rebate system would require a resource one to two days per week to maintain an asset register of all new leaky drains; review inspection reports that demonstrate on-going maintenance by residents; and coordinate a rate rebate for complying residents.
19. The investigation highlights that while there may be some benefits from leaky drains, such as providing a local water source to verge planting, many benefits such as water quality and flooding impacts are not material. It also highlights that the Chippendale area consists of impermeable clays and fills not suitable for infiltration. In addition, there are numerous public liability and asset management issues associated with private assets such as these in the public domain.

20. While providing a rate rebate may incentivise residents to carry out the required ongoing maintenance on leaky drains, this would result in an administrative burden to the City of Sydney that significantly outweighs any associated benefits to the community. In addition, as the City of Sydney does not maintain private stormwater pipes draining across footpaths and nature strips, its stormwater management activities would not be reduced by the residents maintaining leaky drains. Therefore, the annual \$25 Stormwater Management Service Charge will still be required.

KEY IMPLICATIONS

Strategic Alignment - Sustainable Sydney 2030

21. *Sustainable Sydney 2030* is a vision for the sustainable development of the city to 2030 and beyond. It includes 10 strategic directions to guide the future of the city, as well as 10 targets against which to measure progress. This feasibility investigation is aligned with the following strategic directions and objectives:
 - (a) Direction 2 - A Leading Environmental Performer – Objective 2.3: reduce potable water consumption and stormwater gross pollutant loads to the catchment within the local government area.
22. In 2013, Council endorsed the City's Decentralised Water Master Plan (DWMP), which sets out how these Sustainable Sydney 2030 targets may be achieved through water efficiency, recycling and Water Sensitive Urban Design (WSUD) initiatives. It further defines additional targets in these key areas to ensure the City's vision of a water sensitive city is realised, including to:
 - (a) replace 30 per cent of mains water demand across the City of Sydney Local Government Area (LGA) with recycled or alternative non-potable water generated from local water resources by 2030; and
 - (b) reduce sediments and suspended solids by 50 per cent and nutrients by 15 per cent discharged into the waterways from stormwater runoff generated across the City of Sydney LGA by 2030.
23. The City currently has two precinct-scale stormwater harvesting schemes under development at Green Square and Sydney Park. It also has 11 park-scale stormwater harvesting schemes in operation. By harvesting stormwater for treatment and reuse, each of these schemes contributes to both the recycled water and the water quality targets.
24. The City is also working towards achieving the water quality target by implementing the following initiatives as set out in the DWMP:
 - (a) mandating WSUD in all new developments;
 - (b) retrofitting the drainage network with gross pollutant traps;
 - (c) retrofitting public open space with a combination of raingardens, swales and wetlands in at least 20 per cent of available opportunities; and
 - (d) incorporating WSUD during at least 10 per cent of opportunities presented by renewal of road and other streetscape projects.

25. While leaky drains offer some benefits when correctly installed and maintained in areas with well drained soils, their treatment benefits are considered minimal because the initial amount of pollution on the roofs is very low. Intercepting runoff from the streets through raingardens is considered more effective at reducing stormwater pollution.

Organisational Impact

26. Coordinating a leaky drains project across Chippendale would require a City staff resource for approximately two days per week to ensure appropriate site selection, supervision, safety, insurance, road opening permits and workmanship is delivered throughout the project period. Administering a rate rebate system would require a City staff resource for one to two days per week to maintain an asset register of all new leaky drains; review inspection reports that demonstrate regular maintenance by residents; and coordinate a rate rebate for complying residents, on an ongoing basis.

Risks

27. The key risks presented in the feasibility investigation include risks to:
- (a) underground infrastructure including building foundations, due to the impermeability of Chippendale's clay soils and fill not allowing rapid infiltration of additional water via leaky drains;
 - (b) public safety during installation and maintenance of leaky drains by the community, due to the proximity of leaky drain sites to roads; and
 - (c) houses, the nature strip and the footpath, due to clogging of leaky drains with leaves and debris, tree root blockage and breakage, if leaky drains are not maintained appropriately.

Social / Cultural / Community

28. The proposed leaky drains project would have a positive impact on the community of Chippendale. The Sustainable Chippendale members are committed to achieving sustainability outcomes in their community. As outlined in this report, there are issues of site safety, supervision and insurances that would need to be managed.

Environmental

29. While leaky drains do offer some environmental benefits, the Chippendale area consists of impermeable clays and fills not suitable for infiltration.
30. The volumes of stormwater likely to be diverted by the existing leaky drains in Chippendale have been modelled and found to be approximately one twentieth of the four million litres per year stated in Council's resolution of 23 June 2014.
31. The treatment benefits of leaky drains in Chippendale are considered minimal because the initial amount of pollution on roofs is very low. Intercepting runoff from the streets through raingardens is considered more effective at reducing stormwater pollution. The City's raingardens provide additional treatment and flow capacity and are specifically designed for their purpose and location.

32. Leaky drain systems will cause a negligible reduction of frequent flooding.

BUDGET IMPLICATIONS

33. The proposed leaky drains project is not included in current or proposed future budgets.
34. Council's resolution indicated a capital cost of \$10,000 would be required to implement the project. The additional costs to Council are outlined within the Organisational Impact section of this report, and include a City staff resource of one to two days per week both during the project period and on an ongoing basis.

OPTIONS

35. The feasibility investigation at Attachment A explores some alternative solutions to leaky drains that may be more appropriate in Chippendale within the geological limitations. These include small rainwater tanks within residents' properties to collect rainwater for irrigation purposes; above ground planter beds connected to the downpipes for irrigation before overflowing to street drainage; and proprietary products such as Aquakerb that enable water in the gutter to infiltrate deep into the ground.
36. The City of Sydney will continue to implement the WSUD initiatives as identified in the DWMP and detailed in paragraph 24 of this report. The City has over 130 raingardens across the LGA, and 20 in the Chippendale catchment alone. Raingardens are designed to accommodate and treat the polluted first flush flowing off large catchment areas, including roofs and roads, during rain. These are widely acknowledged as a successful method of improving water quality and providing all the associated benefits of urban greening.

PUBLIC CONSULTATION

37. Reid Environmental met a representative of Sustainable Chippendale on site on 6 January 2015 as part of the feasibility investigation.

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