Major and Minor Sewer Works

Sewer Design Criteria to Assist in the Completion of a Section 305 Application under the *Water Management Act 2000*

Hawkesbury City Council

This document contains important information.
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Introduction

Hawkesbury City Council (Council) is a Water Supply Authority under the *Water Management Act 2000* which specifically manages sewerage services for the Windsor Sewerage Scheme and recycled water for the South Windsor Recycled Water Scheme. Potable water within the Windsor Sewerage Scheme area is still managed by Sydney Water.

Where any development or engineering works are to be undertaken within the Windsor Sewerage Scheme, the owner or developer is responsible for ensuring the Water Supply Authority's (Hawkesbury City Council) sewerage assets are considered.

Where works are privately certified it is the Private Certifier's responsibility to obtain Council's conditions and/or approval prior to certifying a development as being suitable for construction. Council may issue this approval in the form of a section 307 Compliance Certificate or a certificate that plans are compliant (endorsement) depending on the type of development proposed.

Purpose

The purpose of this document is to provide some guidance to Developers submitting a Section 305 Application for sewer works which will be assessed by Waste Management under Section 306 in pursuit by the developer or applicant of a Section 307 Certificate of Compliance for sewer works under the *Water Management Act 2000*.

It covers how to:

- determine whether a project is classified a major or minor work
- procedures regarding application
- design criteria that differ from Sydney Water or NSW Public Works
- items that are frequently overlooked when preparing a design.

In addition Section 8 (Building over or Adjacent to Sewers) of the 'Standard Specification for Construction and Testing of Sewerage Works' has been reprinted here, as it is a more common occurrence in recent times.

Authority

The Authority controlling the Windsor Sewer Scheme is Hawkesbury City Council. This catchment includes Windsor, parts of Pitt Town, McGrath's Hill, Mulgrave, Bligh Park, Windsor Downs and Clarendon. The construction or alteration of sewer mains within this scheme can only be done by consent from Council's Waste Management Branch.

Community Title Subdivisions

Sewer mains proposed for Community Title subdivisions that do not discharge to Sydney Water or Hawkesbury City sewers must still be constructed to a standard specification. The applicant must either submit Sydney Water or NSW Department of Public Works approved plans with the Subdivision or Development Application or submit plans to Council's Waste Management Branch for approval.

National Sewer Code

While Council adopts the National Sewer Code in principle, much of the content is left to the "*discretion of the approving Authority*". It is therefore preferred that in addition to specific design criteria mentioned in this document Developers use Sydney Water or NSW Public Works design specifications when submitting sewer plans for approval.

Fees

Fees apply and are set out in the current edition of Council's Revenue Pricing Policy. A copy of the Revenue Pricing Policy is available for perusal at the Customer Service counter. Fees for Sewer Works identified in the Section 306 assessment must be paid when the Section 306 Assessment is available for collection.

In addition to application fees any of the following fees may apply: 'Works As Executed' bond, road opening fees and/or an up-front restoration fees in lieu of a Defects Liability period.

Works as Executed

All work is subject to Works as Executed. Requirements can be found in Item 6 of the Short Specification attached to the application. Details of the Works as Executed package can be found in Clause 1.3 of the 'Standard Specification for the Construction and Testing of Sewerage Works'.

Defects Liability and Security

All major work is subject to some form of Security and Defects Liability period. Details for larger projects where Council is not a Principal to the Contract can be found in Clause 1.4 of the 'Standard Specification for the Construction and Testing of Sewerage Works'. The Defects Liability and Security is defined in Tender and Contract documentation where Council is a Principal to the Contract.

The minimum size project where Security is required is when the sewer works serves a subdivision of eight lots or more, where the work is greater than two meters in depth or where the total length of sewer mains laid exceeds 80 meters. Security is calculated as set out in Clause 1.4 of the 'Standard Specification for the Construction and Testing of Sewerage Works' with a minimum security of $1,000.

The Defects Liability period for these and smaller projects still classed as major works will be assessed on a case-by-case basis or may be dealt with by an up-front restoration fee in lieu of a Defects Liability period.

Application Approval

Application for major and minor sewer works is a two part process as a result of Council being a self-insurer under Safe Work NSW and as part of 'Due Diligence' any Contractor hired by the applicant must be deemed competent to do the work at hand.

Application for permission to carry out major or minor sewer works is now a two-part process.

Part 1 - Design approval only for proposed sewer works.

Part 2 - Permission to construct approved sewer works.

See 'Procedure for Application' for details.

Section 2 Procedure for application

Classification of Work

Minor Works consists of a new junction cut into an existing sewer main or laying a new side line up to 5 meters in length or a new branch line with a manhole up to 20 meters in length or laying up to 20 meters of new sewer mains or construction of a new manhole over an existing sewer main or concrete encasing sewer mains or building over a sewer.

Major Works generally consists of supplying a gravity sewer service to subdivisions or any works where the total length of the new sewer or affected existing sewer exceeds 20 meters or greater than two meters in depth.

Building over sewers or building within the Zone of Influence of a sewer is generally classified as minor works; however, this depends on the length of affected main.

Procedure for Application

Procedure is now a separate document entitled Major and Minor Sewer Works.

Major and Minor Sewer Works

Application under Section 305 of the *Water Management Act 2000* for a Section 307 Certificate of Compliance Regarding Council's Sewerage Assets

Section 3 Sewer Design Criteria

Subdivisions

In a Torrens Title subdivision, current legislation indicates that each lot to be sewered must have a separate connection to the Council's sewer.

When a dual occupancy or a community title development is to be subdivided under the Torrens Title system, a separate junction or connection to Council's sewer must be provided for each lot. It is worthwhile considering future use when developing dual occupancies and community titles, as converting the sewer to suit Torrens Title may prove expensive.

Future Development

Where subdivision development is located downstream of potential future development, the sewer must be designed to accommodate loadings from the upstream areas.

Plans

Sewer plans submitted to Council for approval must be drawn to a recognised standard, preferably Supplement 3 Part 401 of Australian Standard AS1100.401 - 1992 - 'Engineering Survey and Engineering Survey Design Drawing'. However, plans drawn to Sydney Water or Public Works standards will be accepted. The scale of the plan must either 1:500 or 1:1,000. The horizontal scale of the longitudinal sections must be drawn to 1:500 or 1:1000 with a 5:1 horizontal: vertical ratio.

Plan View

The plan must include the following:

- a numbered lot layout
- AHD levels and show origin of levels on the plan
- an arrow for each lot to be served generally positioned in the downstream corner of the lot
- any existing or proposed easements, storm water systems, service and driveways adjacent to proposed sewer
- any existing or proposed easements, storm water systems, services and driveways that cross the path of the proposed mains
- any existing sewer
- areas of lots not served if applicable
- arrows indicating direction of flow of proposed sewer mains
- contours at intervals that accurately represent the final surface

- labels on all sewer lines and manholes and distinguish between existing and proposed mains
- manhole to boundary dimensions as either a square off (SO) or an each way (EW) value and a distance between the manhole and the nearest boundary corner
- proposed sewer layout.

Longitudinal Section

The longitudinal sections must include the following:

- all roads, driveway crossings, fences and any other structures and obstructions in the path of the proposed mains
- all underground services and drainage lines in the path of the proposed mains
- any special bedding if required
- Datum RL
- depth of sewer
- design invert level
- drops through manholes
- finished surface level
- grades as a percent
- line and manhole labels
- pipe chainage at manholes and dead end
- pipe size, class, type and material
- spacing of bulkheads and trench stops.

Sewer Alignment

General

Where possible the alignment of sewers should be such as to serve the maximum number of lots with the minimum length of mains. Sewer mains are generally laid parallel to boundaries as follows:

- 1.0m from rear boundary to centreline of pipe
- 1.5m from rear boundary to centreline of pipe when laid parallel to inter-allotment drainage
- 1.0m from side boundaries to centreline of pipe
- 1.0m - 4.0m from front boundary to centreline of pipe.

Note: *Where sewer lines are laid alongside boundaries they may have to be concrete encased through the building zone at time of construction. This will depend on the size of the lot.*

Where significant vegetation interferes with general sewer alignment, variations to proposed construction may be required and written approval necessary.

Crossing Empty Blocks

If crossing an empty block cannot be avoided, the sewer line must cross the block as near as possible to a right angle. Care must be taken to avoid the area, which is most likely to be built upon. Future use must be thoroughly checked.

Crossing Roads, Rails and Waterways

Road, rail, and waterway crossings should be, if possible, at right angles to the obstruction. Crossing waterways should be below bed level.

Crossing Hillsides

Where possible, sewer mains are to be constructed at an acute angle to the contours. This is to avoid washouts in the trench (see clause 6.3.3 of the Standard Construction Specification) and scars on a hillside.

Crossing Services

Sewers should cross large services or banks of services as close to right angles as possible. Sewer mains crossing above or below other services must be designed so that there is adequate clearance between the main and the other service. The minimum clearances desirable are:

- 8 metres for existing services
- 15 metres for proposed services.

Small Lots

Where small lots are involved, such as 450-500 square meters, consideration in design must be given to access to and maintenance of manholes in the rear of properties. If access will be a problem with proposed housing, then sewer mains must serve lots along the front boundary.

Sewer Depth

General

For a given number of tenements the designer has a range of pipe sizes and gradient combinations of which many will be acceptable hydraulically. The selection of pipe size and gradient is governed by the following considerations:

- the sewer should be as shallow as possible, but of sufficient depth to drain the properties it serves (current legislation indicates a minimum depth of 1.2 meters between the top of gully and the soffit of the mains sewer)
- the pipe must have adequate cover or be protected.
- initially, the sewer must have a sufficient number of connections to ensure that self-cleansing occurs
- the pipe must be of a size and gradient that will allow it to carry the expected flow from the ultimate number of connections
- the pipe must be located to avoid other services that cannot be reasonably relocated.

Minimum Cover Requirements

Minimum cover over sewer pipes without special protection is set out as follows:

In Private Property, Reserve or Open Space	
• 150mm	0.50m
• 225mm	0.60m
• 300mm	0.70m
• 375mm	0.90m
• 450mm	1.00m
• 525mm	1.10m
• 600mm	1.10m
In Footpaths	
• All sizes	1.10m

In Roadways	
In roads not subjected to heavy traffic and where all other services exist and these services and road levels are not likely to change.	
• All sizes	1.20m
Other Roads	
• All sizes	1.35m

Manholes

General

Manholes are placed on gravity sewers at changes in direction, grade or pipe size.

Maximum Spacings between Manholes

Spacing's between manholes are set out as follows:

• 150-300mm pipe	100 metres
• Greater than 300mm pipe	120 metres

Fall through Manholes

• 0 to 45º deflection	50mm
• 45 to 90º deflection	100mm

Drop manholes

Where the difference in levels of the inlet and outlet are greater than can be accommodated with a fall through the invert of a manhole, an external drop must be constructed.

Deadends and Sidelines

General

All deadends and sidelines exceeding five meters in length must end with a rodding point. See also section 6.4.4 of the standard Construction Specification.

Maximum length

• Deadend	50 metres
• Sideline	5 metres
• Sideline connected to MS	20 metres

Hydraulic Load and Pipe Size

General

The following design load is based on research and measurement and has been used for the hydraulic design of the South Windsor Wastewater Treatment Plant.

Developers may submit plans for assessment based on either Sydney Water or NSW Department of Public Works hydraulic load and grade tables. Tables provided by Public Works produce results closer to local design flows.

Hydraulic Load - Residential Sewers (reticulated water)

Hydraulic loading for design of sewers in the Windsor Sewerage Catchment is based on 240 litres per person per day, with an occupancy rate of 3.5 people per household.

• 1 person = 1EP = 240 l/d
• 3.5 people = 1T = 840 l/d
• EP = Equivalent Population
• T = Tenement (household)
Average Dry Weather Flow = 0.010 litres per second per tenement
Stormwater Allowance = 0.058 litres per second per tenement

Hydraulic Load - Residential Sewers (tank water)

Hydraulic loading for design of sewers where a household is connected to tank water is based on 183 litres per person per day, with an occupancy rate 3.5 people.

• 1 person = 1EP = 183 l/d
• 3.5 people = 1T = 640.5 l/d
• EP = Equivalent Population
• T = Tenement (household)
Average Dry Weather Flow = 0.0074 litres per second per tenement
Stormwater Allowance = 0.0385 litres per second per tenement

Note: *Formula for calculating peak dry weather flow (PDWF) and peak wet weather flow (PWWF) can be found in the Public Works' Manual of Practice: Sewer Design.*

Hydraulic Load - Commercial and Industrial

Where land has been zoned for commercial and industrial activities and the use is unknown, minimum sewer design must be the same as for residential (reticulated water).

Pipe Sizes

• Residential (minimum)	150mm
• Commercial and Industrial (minimum)	225mm

Section 4 Building over Council's sewer mains

General

Council's general policy is not to allow building over sewer mains. However, when circumstances indicate that the economic use of the property may be restricted as a result of sewer location, Developer/Owners may make written application for approval to build adjacent to or over sewer mains.

Approval

Where approval is granted, the Developer/Owner must forward to Council an Identification Survey. The survey must show accurate position of the main and the completed structure built over the main. These measurements must be related to the property boundary. A Registered Surveyor must conduct the Identification Survey.

Indemnity

Where an indemnity applies, it will be recorded on Council's property file.

With regard to lightweight removable structures, the property owner must indemnify Council against all costs associated with the removal and or subsequent re-erection of the subject structure, and give an undertaking to remove the structure when required to do so by Council.

In case of an emergency, Council may remove the structure to gain access to the sewer and Council shall not be held responsible for damage to the structure. The cost of such removal and subsequent re-erection of the subject structure will be borne by the property owner.

With regard to substantial structures, Council will not be held responsible for any damage to the structure built over or adjacent to a sewer main, in the event the main needs to be excavated for repairs.

Clearances

Horizontal Clearance to Sewers

For open trench access, regardless of whether or not shoring is required, the face of any footing or pier must be a minimum 600mm clear of the edge of the sewer main. The Superintendent or his representative must approve any variation on the minimum clearance in writing

In the case of deep-shored excavations, minimum clearance may have to be increased to 900mm. Sufficient headroom must be maintained to drive the trench shoring, i.e.; headroom equal to the minimum depth of trench plus 600mm.

Where access will be by a shored drive or tunnel, the footings are to be designed so that an excavation, at least 1.2 meters wide (more for larger size pipes) can be carried out. This area need not necessarily be concentric with the centreline of the conduit but no footing should be closer than 600mm to the outside of the conduit (see Standard Drawing SM5-2 and 3).

Vertical Clearance over Sewers

Where a structure is built over a sewer main, sufficient headroom must be maintained to drive trench shoring or for tunnelling (see Standard Drawing SM5-1 and 3)

Length of Tunnelling from Open Space

This must not exceed six meters, i.e., a maximum of 12 meters of the sewer may be built over if access is available from both ends. Where the likelihood of future work is minimal, approval may be granted to increase, in single distance, from six to 7.5 meters for 225mm dia. mains, and to 10 meters for 300mm dia. or larger mains.

Building Adjacent to Sewers

When building adjacent to Council sewer mains the Contractor must consider the following.

In order to maintain the structural integrity of Council's sewer main, adjacent footings must be designed and constructed so that the footings descend at least 900mm below the zone of influence of the trench. Zone of influence is measured from a point starting 600mm from the centreline and at the invert level of the sewer main. The angle of repose shall be assumed to be 1:1 (45°) in undisturbed clay or similar material, and 1:2 (30°) from horizontal in sand or filled ground, whether compacted or not. All supporting piers adjacent to the sewer main must be reinforced for subsequent tying into the strip footing or perimeter beam. Details of the proposed footings system must be submitted for approval prior to commencement of work. The contractor must accurately locate the position of the main prior to commencement of work (See Standard Drawing SM5-2).

When boring holes for footings adjacent to sewer mains, the Contractor/Developer must ensure the drilling equipment has not damaged the sewer main.

Building over Sewers

General Restrictions

There are some general restrictions that must be considered when building over a sewer main. They are as follows:

a) building over manholes, lampholes, vertical shafts or any rodding points will not be permitted
b) building over sewer rising mains (pumping mains) will not be permitted
c) unimpeded access must be maintained to manholes, inspection shafts vertical shafts, lampholes or any sewer main rodding points at all times.

Lightweight Removable Structures/Outdoor Living Areas

Lightweight removable structures may include but are not limited to carports, pergolas, aboveground swimming pools, decking, garden sheds, or awnings.

The above structures may be built over any reticulation main, subject to the following:

a) general restrictions apply. See part IV clause 6.1
b) where applicable, that portion of the structure, which projects over the sewer main, must be constructed as to be readily detachable from the remainder of the structure
c) in case of an emergency, Council may remove the structure to gain access to the sewer and Council will not be held responsible for damage to the structure (the cost of such removal and re-erection will be borne by the property owner)
d) indemnity applies. See part IV, clause 3.

Substantial Structures

Substantial structures may include but are not limited to in ground swimming pools; residential, commercial, industrial buildings and outbuildings, such as residences, garages, house extensions, home units, commercial buildings and factories.

If approval is granted construction is subject to the following conditions:

a) general restrictions apply (see part IV clause 6.1)
b) the structure must be piered and supported in accordance with Council's specifications to maintain structural stability should the sewer main require excavation (see Standard Drawing SM5-1)
c) to minimise the need for future work on the sewer, the main built over must be encased in concrete in accordance with Council’s Specification (see Standard Drawing SM5-1 and Clause 6.6.3 in the Standard Specification).

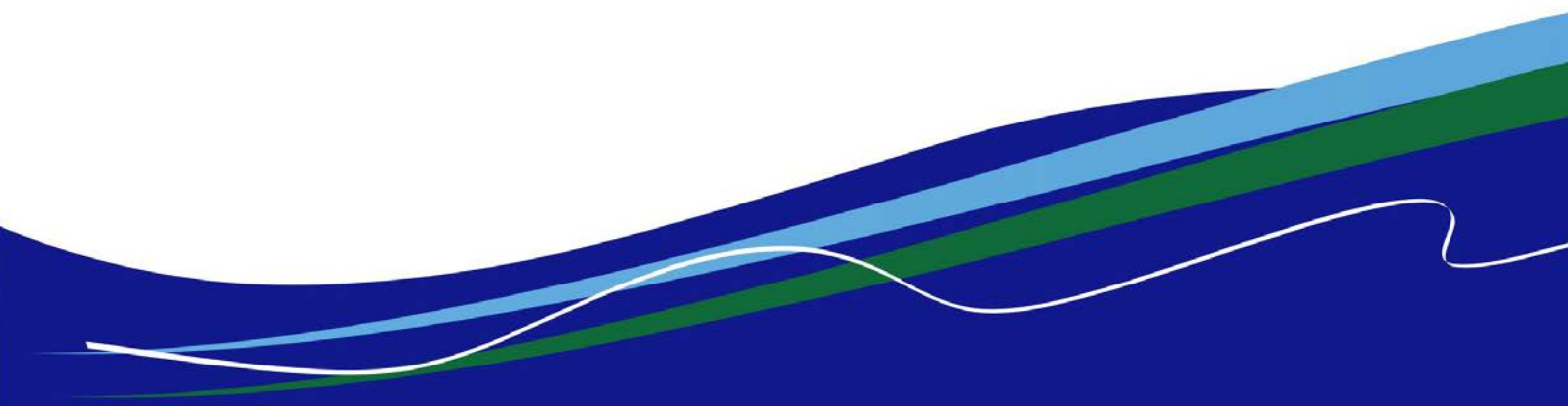
Indemnities apply. See part IV clause 3.

Second-storey Additions

Where the footings of the existing building are to be used, and these were taken below the zone of influence under Council's supervision when the original building was erected, an Engineer's Certificate, stating that the original footings are satisfactory to carry the additional building loads, is to be submitted to Council.

If Council has no record of the original footings, an additional storey may be added only if Council's requirements, such as encasement and underpinning, are observed. Council must be satisfied of the structural adequacy of the building.

Approval will be withheld if the sewer or access to the sewer is not considered satisfactory.



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