Appendix A

Species at Risk List – Middlesex County

Table A.1 – Federal and Provincial Species at Risk with Potential Habitat in Middlesex County

Type	Species Common Name	Species Scientific Name	Federal Status	Provincial Status	Suitable Habitat in the Study Area
Bird	Acadian Flycatcher	*Emphidonax virescens*	Endangered	Endangered	Yes
Bird	Bald Eagle	*Haliaeetus leucocephalus*	Not Applicable	Special Concern	No
Bird	Bank Swallow	*Riparia riparia*	Threatened	Threatened	Yes
Bird	Barn Swallow	*Hirundo rustica*	Threatened	Threatened	Yes
Bird	Black Tern	*Chlidonias niger*	Not Applicable	Special Concern	No
Bird	Bobolink	*Dolichonyx oryzivorus*	Threatened	Threatened	Yes
Bird	Canada Warbler	*Cardellina Canadensis*	Threatened	Special Concern	Yes
Bird	Cerulean Warbler	*Setophaga cerulean*	Endangered	Threatened	Yes
Bird	Common Nighthawk	*Chordeiles minor*	Threatened	Special Concern	Yes
Bird	Eastern Meadowlark	*Sturnella magna*	Threatened	Threatened	Yes
Bird	Eastern Wood-Pewee	*Contopus virens*	Special Concern	Special Concern	Yes
Bird	Golden-Winged Warbler	*Vermivora chrysoptera*	Threatened	Special Concern	Yes
Bird	Grasshopper Sparrow	*Ammodramus savannarum*	Special Concern	Special Concern	Yes

Type	Species Common Name	Species Scientific Name	Federal Status	Provincial Status	Suitable Habitat in the Study Area
Bird	Least Bittern	*Ixobrychus exilis*	Threatened	Threatened	No
Bird	Northern Bobwhite	*Colinus virginianus*	Endangered	Endangered	Yes
Bird	Peregrine Falcon	*Falco peregrines*	Special Concern	Special Concern	Yes
Bird	Red-headed Woodpecker	*Melanerpes erythrocephalus*	Threatened	Special Concern	Yes
Bird	Wood Thrush	*Hylocichla mustelina*	Threatened	Special Concern	Yes
Bird	Yellow-Breasted Chat	*Icteria virens*	Endangered	Endangered	Yes
Fish	Black Redhorse	*Moxostoma duquesnei*	Threatened	Threatened	No
Fish	Blackstripe Topminnow	*Fundulus notatus*	Special Concern	Special Concern	No
Fish	Eastern Sand Darter	*Ammocrypta pellucida*	Threatened	Endangered	No
Fish	Grass Pickerel	*Esox americanus vermiculatus*	Special Concern	Special Concern	No
Fish	Northern Brook Lamprey	*Ichthyomyzon fossor*	Special Concern	Special Concern	No
Fish	Northern Madtom	*Noturus stigmosus*	Endangered	Endangered	No
Fish	Northern Sunfish	*Lepomis peltastes*	Special Concern	Special Concern	No
Fish	Pugnose Minnow	*Opsopoeodus emiliae*	Threatened	Threatened	No
Fish	River Redhorse	*Moxostoma carinatum*	Special Concern	Special Concern	No
Fish	Silver Lamprey	*Ichthyomyzon unicuspis*	Special Concern	Special Concern	No

Type	Species Common Name	Species Scientific Name	Federal Status	Provincial Status	Suitable Habitat in the Study Area
Fish	Silver Shiner	*Notropis photogenis*	Threatened	Threatened	No
Fish	Spotted Sucker	*Minytrema melanops*	Special Concern	Special Concern	No
Mussel	Eastern Pondmussel	*Ligumia nasuta*	Special Concern	Special Concern	No
Mussel	Fawnsfoot	*Truncilla donaciformis*	Endangered	Endangered	No
Mussel	Kidneyshell	*Ptychobranchus fasciolaris*	Endangered	Endangered	No
Mussel	Mapleleaf	*Quadrula quadrula*	Special Concern	Special Concern	No
Mussel	Northern Riffleshell	*Epioblasma torulosa rangiana*	Endangered	Endangered	No
Mussel	Rainbow	*Villosa iris*	Special Concern	Special Concern	No
Mussel	Rayed Bean	*Villosa fabalis*	Endangered	Endangered	No
Mussel	Round Hickorynut	*Obovaria subrotunda*	Endangered	Endangered	No
Mussel	Round Pigtoe	*Pleurobema sintoxia*	Endangered	Endangered	No
Mussel	Salamander Mussel	*Simpsonaias ambigua*	Endangered	Endangered	No
Mussel	Snuffbox	*Epioblasma triquetra*	Endangered	Endangered	No
Mussel	Threehorn Wartyback	*Obliquaria reflexa*	Threatened	Threatened	No
Mussel	Wavy-rayed Lampmussel	*Lampsilis fasciola*	Special Concern	Threatened	No
Reptile and Amphibian	Blanding’s Turtle	*Emydoidea blandingii*	Threatened	Threatened	No

Type	Species Common Name	Species Scientific Name	Federal Status	Provincial Status	Suitable Habitat in the Study Area
Reptile and Amphibian	Eastern Musk Turtle	*Sternotherus odoratus*	Special Concern	Special Concern	No
Reptile and Amphibian	Northern Map Turtle	*Graptemys geographica*	Special Concern	Special Concern	No
Reptile and Amphibian	Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern	No
Reptile and Amphibian	Blue Racer	*Coluber constrictor foxii*	Endangered	Endangered	No
Reptile and Amphibian	Butler's Gartersnake	*Thamnophis butleri*	Endangered	Endangered	No
Reptile and Amphibian	Eastern Foxsnake	*Pantherophis gloydi*	Endangered	Endangered	No
Reptile and Amphibian	Eastern Hog-nosed Snake	*Heterodon platirhinos*	Threatened	Threatened	No
Reptile and Amphibian	Gray Ratsnake	*Pantherophis spiloides*	Endangered	Endangered	No
Reptile and Amphibian	Massassauga	*Sistrurus catenatus*	Endangered	Endangered	No
Reptile and Amphibian	Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern	Yes
Reptile and Amphibian	Queensnake	*Regina septemvittata*	Endangered	Endangered	No
Reptile and Amphibian	Common Five-lined Skink	*Plestiodon fasciatus*	Endangered	Endangered	No
Insect	Monarch	*Danaus plexippus*	Special Concern	Special Concern	Yes
Insect	Rusty-patched Bumble Bee	*Bombus affinis*	Endangered	Endangered	Yes
Insect	Yellow-banded Bumble Bee	*Bombus terricola*	Special Concern	Special Concern	Yes
Mammal	American Badger, jacksoni subspecies	*Taxidea taxus jacksoni*	Endangered	Endangered	No

Type	Species Common Name	Species Scientific Name	Federal Status	Provincial Status	Suitable Habitat in the Study Area
Mammal	Eastern Small-footed Myotis	*Myotis leibii*	Not Applicable	Endangered	Yes
Mammal	Little Brown Bat	*Myotis lucifugus*	Endangered	Endangered	Yes
Mammal	Northern Myotis	*Myotis septentrionalis*	Endangered	Endangered	Yes
Mammal	Tri-coloured Bat	*Perimyotis subflavus*	Endangered	Endangered	Yes
Mammal	Woodland Vole	*Microtus pinetorum*	Special Concern	Special Concern	Yes
Plant and Lichen	American Chestnut	*Casanea dentata*	Endangered	Endangered	No
Plant and Lichen	American Ginseng	*Panax quinquefolius*	Endangered	Endangered	No
Plant and Lichen	Blue Ash	*Fraxinus quadrangulata*	Special Concern	Threatened	No
Plant and Lichen	Butternut	*Juglans cinerea*	Endangered	Endangered	No
Plant and Lichen	Common Hoptree	*Ptelea trifoliata*	Special Concern	Special Concern	No
Plant and Lichen	Crooked-stem Aster	*Symphyotrichum prenanthoides*	Special Concern	Special Concern	Yes
Plant and Lichen	Cucumber tree	*Magnolia acuminata*	Endangered	Endangered	No
Plant and Lichen	Dense Blazing Star	*Liatris spicata*	Threatened	Threatened	Yes
Plant and Lichen	Drooping Trillium	*Trillium flexipes*	Endangered	Endangered	No
Plant and Lichen	Eastern Flowering Dogwood	*Cornus florida*	Endangered	Endangered	No
Plant and Lichen	Eastern Prickly Pear Cactus	*Opuntia humifusa*	Endangered	Endangered	No

Type	Species Common Name	Species Scientific Name	Federal Status	Provincial Status	Suitable Habitat in the Study Area
Plant and Lichen	Goldenseal	*Hydrastis canadensis*	Threatened	Threatened	Yes
Plant and Lichen	Green Dragon	*Arisaema dracontium*	Not Applicable	Special Concern	No
Plant and Lichen	Heart-leaved Plantain	*Plantago cordata*	Endangered	Endangered	Yes
Plant and Lichen	Kentucky Coffee-tree	*Gymnocladus dioicus*	Threatened	Threatened	No
Plant and Lichen	Red Mulberry	*Morus rubra*	Endangered	Endangered	No
Plant and Lichen	Riddell's Goldenrod	*Solidago riddellii*	Special Concern	Special Concern	No
Plant and Lichen	Spoon-leaved Moss	*Bryoandersonia illecebra*	Endangered	Endangered	Yes
Plant and Lichen	Swamp Rose-mallow	*Hibiscus moscheutos*	Special Concern	Special Concern	No
Plant and Lichen	Wood-poppy	*Stylophorum diphyllum*	Endangered	Endangered	Yes

Appendix B

Screening Checklists for Archaeological Resources and Built Heritage Resources, and Cultural Heritage Landscapes

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Archaeological Potential

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

  If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

  The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

  If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

Project or Property Name

Lucan Urban Servicing Master Plan

Project or Property Location (upper and lower or single tier municipality)

Lucan, Township of Lucan Biddulph, County of Middlesex

Proponent Name

Township of Lucan Biddulph

Proponent Contact Information

Jeff Little, Manager of Public Works, jlittle@lucanbiddulph.on.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	☐	☑

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	☐	☑
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	☐	☑
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	☐	☑
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	☐	☑
7. Has the property (or project area) been recognized for its cultural heritage value?	☐	☑

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	☐	☑

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

	Yes	No
9. Are there present or past water sources within 300 metres of the property (or project area)?	☑	☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

	Yes	No
10. Is there evidence of two or more of the following on the property (or project area)?	☑	☐

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
  - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
  - individual designation (Part IV)
  - part of a heritage conservation district (Part V)
  - an archaeological site (Part VI)
- subject to:
  - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
  - a notice of intention to designate (Part IV)
  - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
  - a municipal register or inventory of heritage properties
  - Ontario government's list of provincial heritage properties
  - Federal government's list of federal heritage buildings
- part of a:
  - National Historic Site
  - UNESCO World Heritage Site
- designated under:
  - *Heritage Railway Station Protection Act*
  - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check Regulation 875 and Ontario Regulation 11/06.

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
  - where the building has deep foundations or a basement
- infrastructure development such as:
  - sewer lines
  - gas lines
  - underground hydro lines
  - roads
  - any associated trenches, ditches, interchanges. **Note**: this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
  - primary - lakes, rivers, streams, creeks
  - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
  - high bluffs
  - swamps
  - marsh fields by the edge of a lake
  - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
  - temporary channels for surface drainage
  - rock chutes and spillways
  - temporarily ponded areas that are normally farmed
  - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
  - runoff from farm animal yards
  - manure storage facilities
  - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

- **Elevated topography**

  Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

  Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

  Find out if your property or project area has elevated topography, through:

  - site inspection
  - aerial photographs
  - topographical maps

- **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

  Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

  Find out if your property or project area has sandy soil through:

  - site inspection
  - soil survey reports

- **Distinctive land formations**

  Distinctive land formations include – but are not limited to:

  - waterfalls
  - rock outcrops
  - rock faces
  - caverns
  - mounds, etc.

  They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

  - burials
  - structures
  - offerings
  - rock paintings or carvings

  Find out if your property or project areas has a distinctive land formation through:

  - a site visit
  - aerial photographs
  - 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

  The following resources were collected in these extraction areas:

  - food or medicinal plants e.g., migratory routes, spawning areas, prairie
  - scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
  - resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

  Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

  Early Euro-Canadian settlement include – but are not limited to:

  - early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
  - early wharf or dock complexes
  - pioneers churches and early cemeteries

  For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

  For more information, see:

  - historical maps and/or historical atlases
    - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
    - Archives of Ontario holds a large collection of historical maps and historical atlases
    - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
  - commemorative markers or plaques such as local, provincial or federal agencies
  - municipal heritage committee or other local heritage organizations
    - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
    - for information on commemorative markers or plaques

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
    - is a recognized heritage property
    - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
    - the main project area
    - temporary storage
    - staging and working areas
    - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

Lucan Urban Servicing Master Plan

Project or Property Location (upper and lower or single tier municipality)

Lucan, Township of Lucan Biddulph, County of Middlesex

Proponent Name

Township of Lucan Biddulph

Proponent Contact Information

Jeff Little, Manager of Public Works, jlittle@lucanbiddulph.on.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☑	☐
b. has or is adjacent to a known burial site and/or cemetery?	☐	☑
c. is in a Canadian Heritage River watershed?	☐	☑
d. contains buildings or structures that are 40 or more years old?	☑	☐

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☑	☐
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
    - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

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ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

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iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

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iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

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v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

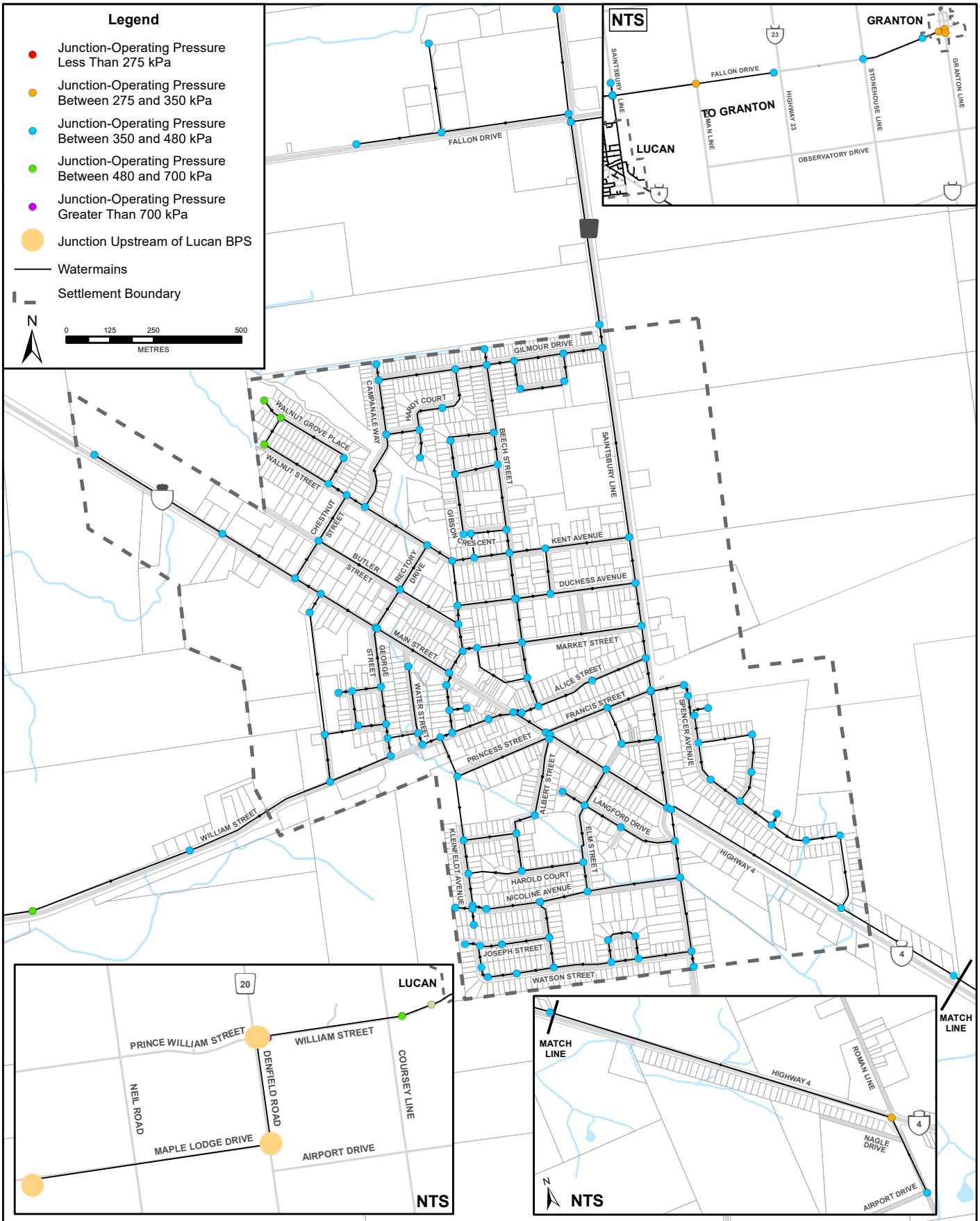
An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Appendix C

WaterCAD® Modelling Information



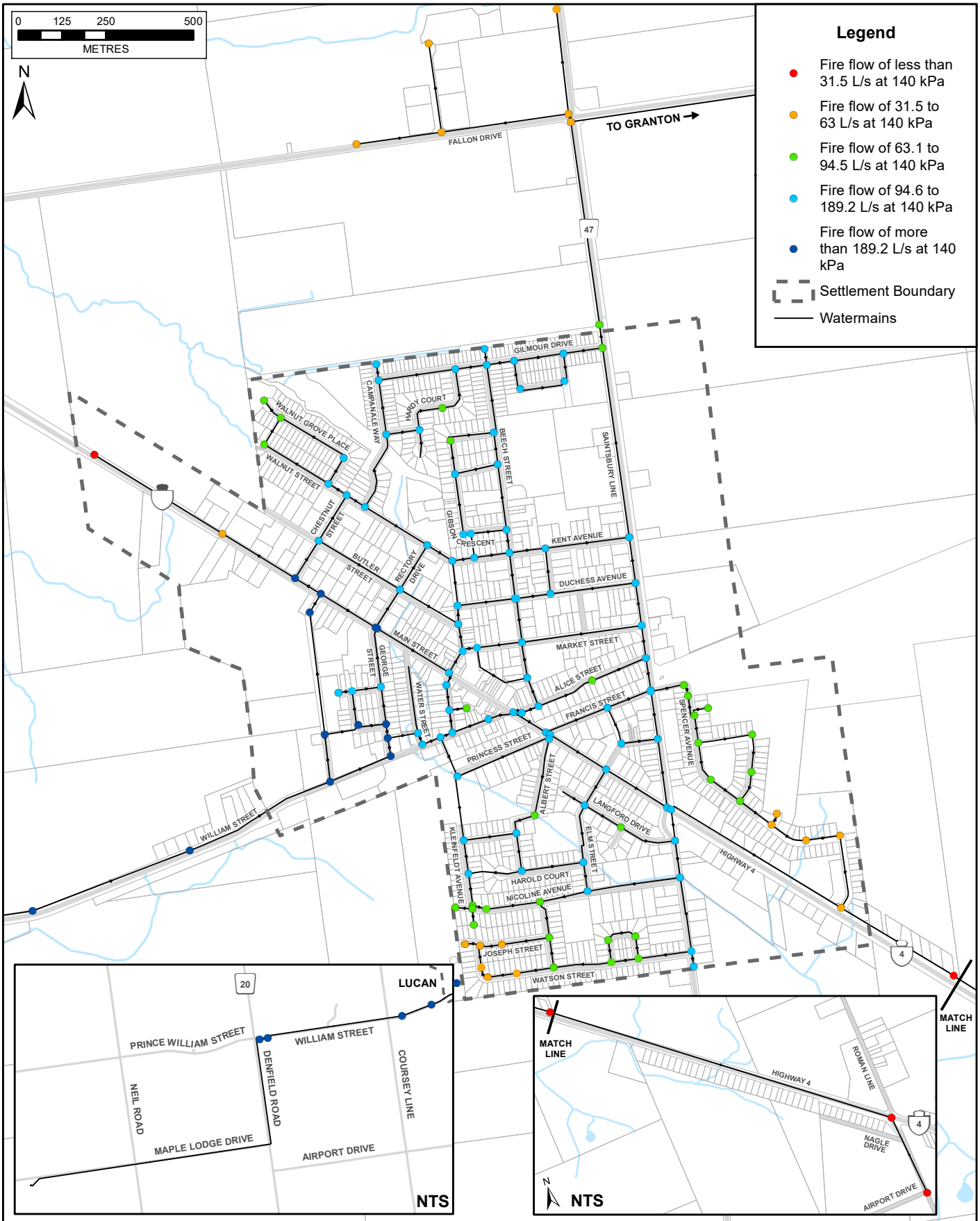
BMROSS engineering better communities

TOWNSHIP OF LUCAN BIDDULPH

URBAN MUNICIPAL SERVICING MASTER PLAN

JUNCTION PRESSURES EXISTING AVERAGE DAY, ET LWL, HLP OFF

DATE	PROJECT No.
JULY 06, 2021	20158
SCALE	FIGURE No.
AS SHOWN	C1



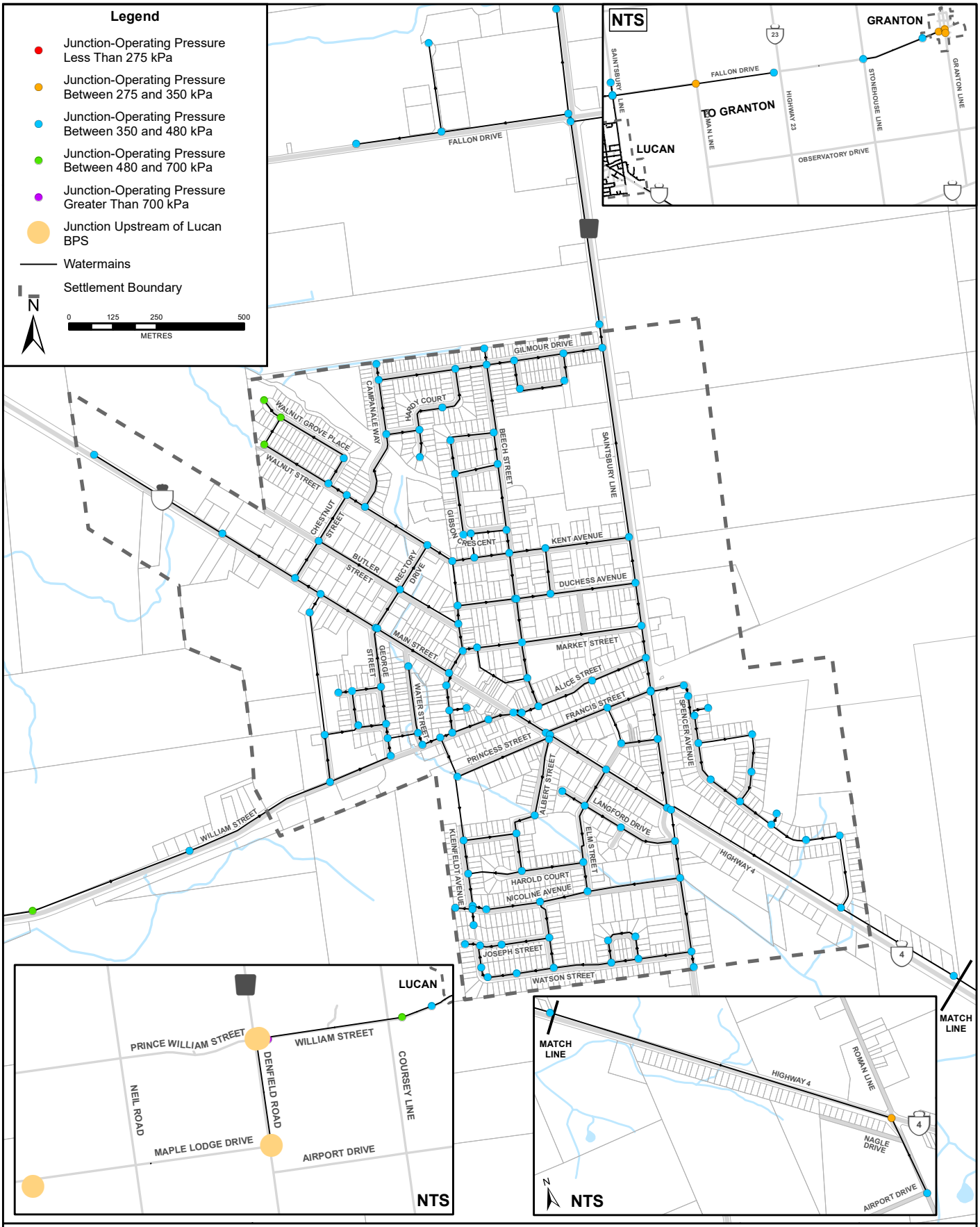
BMROSS engineering better communities

TOWNSHIP OF LUCAN BIDDULPH

URBAN MUNICIPAL SERVICING MASTER PLAN

AVAILABLE FIRE FLOW EXISTING MAXIMUM DAY ET AT BOTTOM OF FIRE STORAGE

DATE	PROJECT No.
JULY 06, 2021	20158
SCALE	FIGURE No.
AS SHOWN	C2



TOWNSHIP OF LUCAN BIDDULPH

URBAN MUNICIPAL SERVICING MASTER PLAN

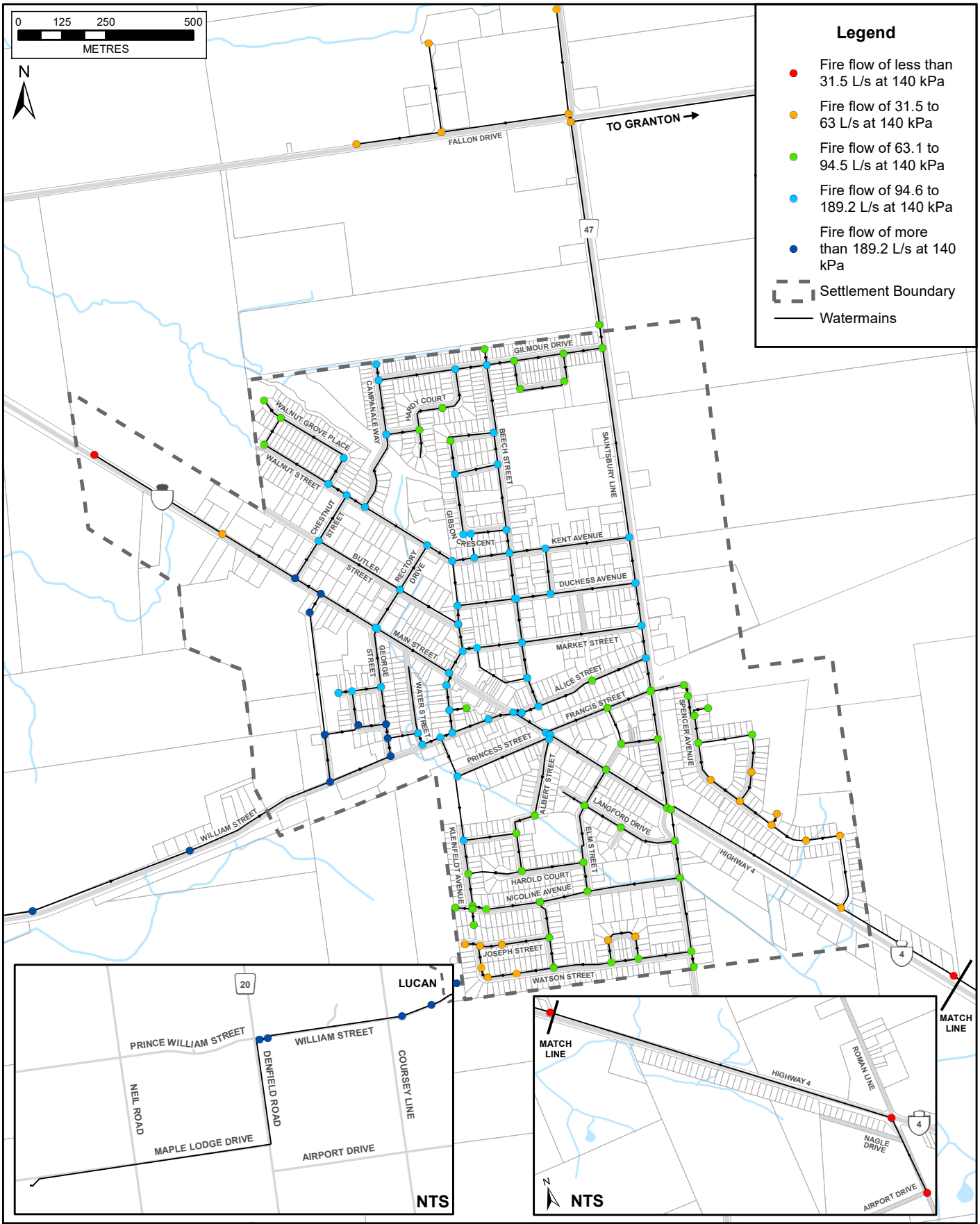
JUNCTION PRESSURES 20 YEAR AVERAGE DAY, ET LWL, HLP OFF

DATE JULY 06, 2021

PROJECT No. 20158

SCALE AS SHOWN

FIGURE No. C3



TOWNSHIP OF LUCAN BIDDULPH

URBAN MUNICIPAL SERVICING MASTER PLAN

AVAILABLE FIRE FLOW 20 YEAR MAXIMUM DAY ET AT BOTTOM OF FIRE STORAGE

DATE	PROJECT No.
JULY 06, 2021	20158
SCALE	FIGURE No.
AS SHOWN	C4

Township of Lucan-Biddulph
Lucan WaterCAD Modelling
Calculations and Notes

Job # :	20158
Date :	January 21, 2021
Revised :	

1.0 Background

BMROSS is completing a Master Plan for the community of Lucan, in the Township of Lucan-Biddulph. Part of the Plan is to evaluate the Lucan water distribution system several considerations. The purpose of these notes is to summarize data used to create a WaterCAD model, and the results of that modelling.

2.0 Analysis & Model Data

2.1 Data

Reference	Item			
	Customer and Demand Info			
20158	Number of Lucan Customers (2020)		1406	units
"	Max. day demand per unit (2020)		1.66	m^3/day/unit
"	Max. to Avg. day ratio		2.65	
"	Peak to Max. day ratio		1.50	
"	Granton Max. day demand (2020)		238	m^3/day
	Lucan Elevated Tank			
Dillon 2014	Summer - start pumps		47.4	m
"	Summer - stop pumps		48.0	m
"	Winter - start pumps		47.1	m
"	Winter - stop pumps		47.4	m
	Base		300	mASL
	Max. water level		348	mASL
1992 ET Design	Equalization storage is top		770	m^3
"		=	2.4	m height
"	Emergency is middle		400	m^3
"		=	1.25	m height
"	Fire storage is bottom		1100	m^3
		=	5.25	m height
20158	HGL @ Chamber 44 (supply to Lucan)		294.5	mASL
DWWP	Lucan Inline Booster Pumps			
	P1, P2, P3		42	L/s
		@	100	m TDH

MECP Guide	Pipe C-factors	
	Pipe Dia. (mm)	C
	150	100
	200-250	110
	300-600	120
	>600	130

MECP Guide	Normal operating pressure range target	350 to 480 kPa
"	Normal operating pressure minimum	275 kPa
"	Fire flow system pressure minimum	140 kPa
"	Maximum allowable system pressure	700 kPa

2.2 Water Demands by Junction - Existing

Lucan

The top 40 water users in Lucan for 2020 consumed a range of 340 to 1,203 m^3 for the year, each. The highest value of 1,203 m^3 is equivalent to 0.04 L/s over the year; even with the application of a significant peaking factor to account for variations over a daily period, the demand per specific location is relativley low. Therefore, distribute Lucan demand evenly over all model junctions.

Total number of existing junctions for Lucan	147	
Total average demand	10.19	L/s
Total maximum demand	27.01	L/s
Total peak demand	40.52	L/s
Average demand per junction	0.069	L/s/junction
Maximum demand per junction	0.184	L/s/junction
Peak demand per junction	0.276	L/s/junction

Granton

Apply Granton demand to J-130 as a single point representing the reservoir. The remainder of the Granton system is turned "off" in the model for the purposes of the Lucan analysis.

Total average demand	1.04	L/s
Total maximum demand	2.75	L/s
Total peak demand	4.13	L/s

2.3 Water Demands by Junction - Future

For future design flow conditions, the calculated demands for various development parcels were added to the junction(s) nearest those developments. No new pipes or junctions were added to the model, but it is noted that for some larger development parcels, internal system looping may improve available fire flow and pressure results.

Lucan Development - from 20158 figures

Development Label	Units	Model Junction(s) to Apply To	Average Demand (L/s)	Maximum Demand (L/s)	Peak Demand (L/s)
1	90	J-255, J-410	0.653	1.729	2.594
2	255	J-550, J-900	1.849	4.899	7.349
3*	331	J-855	2.400	6.359	9.539
4	92	J-630	0.667	1.768	2.651
A	96	J-960, J-965	0.696	1.844	2.767
B	54	J-630	0.392	1.038	1.556
C	63	J-955	0.457	1.210	1.816
D	89	J-280, J-940	0.645	1.710	2.565

* 287 units, plus 2.89 ha Commercial assumed equivalent to 44 residential units

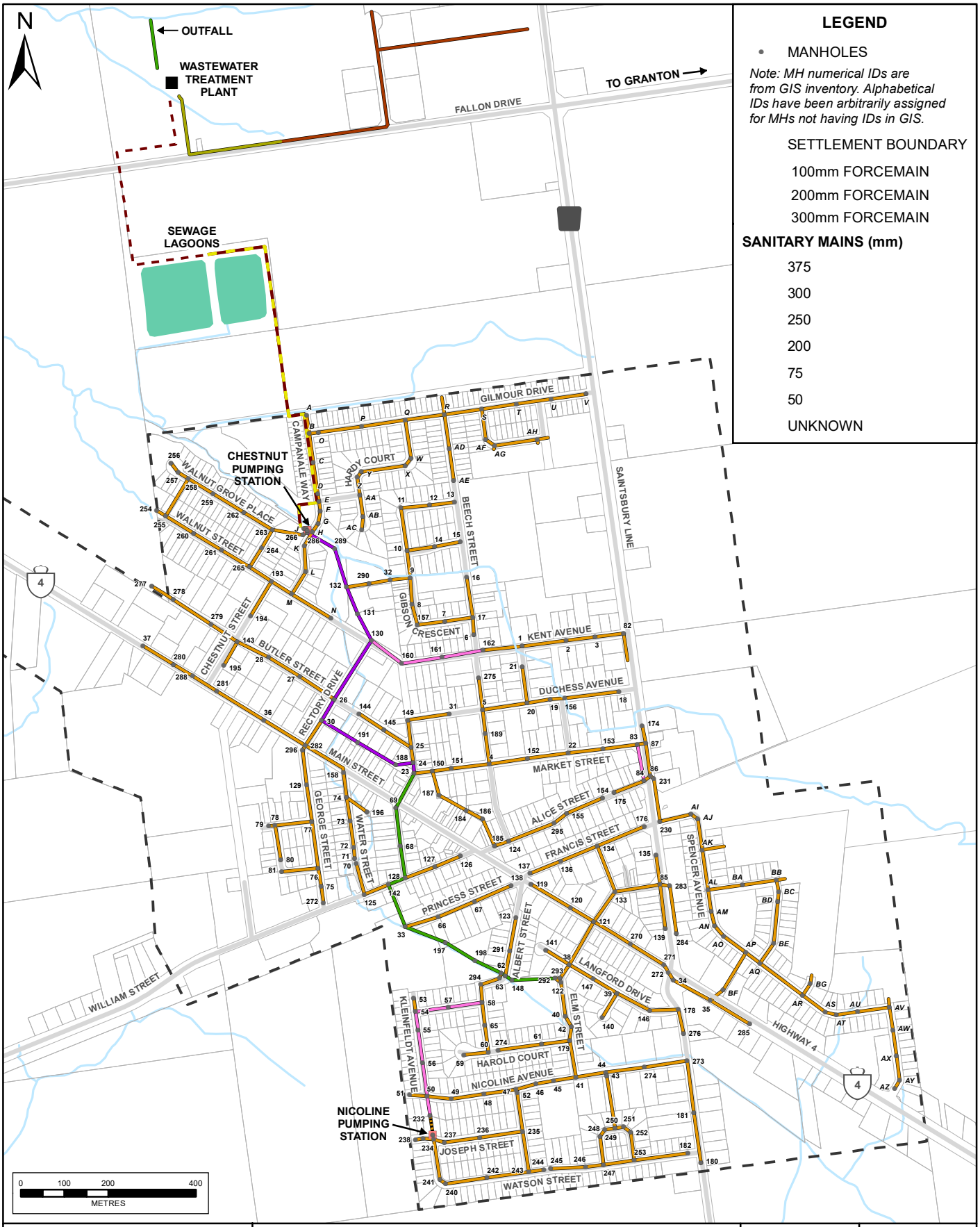
Model Junction	Elevation (mASL)	X (m)	Y (m)	Existing (2020)			20 Year		
				Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Demand (L/s)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Demand (L/s)
J-5	305.0	467765	4781793	0.069	0.184	0.276	0.069	0.184	0.276
J-10	305.0	467658	4781809	0.069	0.184	0.276	0.069	0.184	0.276
J-15	305.0	467658	4781806	0.069	0.184	0.276	0.069	0.184	0.276
J-20	302.5	467271	4782071	0.069	0.184	0.276	0.069	0.184	0.276
J-25	302.4	467274	4782072	0.069	0.184	0.276	0.069	0.184	0.276
J-30	300.0	466709	4782237	0.069	0.184	0.276	0.069	0.184	0.276
J-35	303.2	467106	4781562	0.069	0.184	0.276	0.069	0.184	0.276
J-40	298.5	466781	4782473	0.069	0.184	0.276	0.069	0.184	0.276
J-45	305.0	467573	4781418	0.069	0.184	0.276	0.069	0.184	0.276
J-50	300.0	466872	4781989	0.069	0.184	0.276	0.069	0.184	0.276
J-55	301.0	467246	4782268	0.069	0.184	0.276	0.069	0.184	0.276
J-60	301.9	467121	4781921	0.069	0.184	0.276	0.069	0.184	0.276
J-65	301.1	467082	4781860	0.069	0.184	0.276	0.069	0.184	0.276
J-70	305.0	467783	4781738	0.069	0.184	0.276	0.069	0.184	0.276
J-75	305.0	467781	4781018	0.069	0.184	0.276	0.069	0.184	0.276
J-80	305.0	467716	4781468	0.069	0.184	0.276	0.069	0.184	0.276
J-85	305.0	467370	4781682	0.069	0.184	0.276	0.069	0.184	0.276
J-90	305.0	467367	4781670	0.069	0.184	0.276	0.069	0.184	0.276
J-95	305.0	467752	4781823	0.069	0.184	0.276	0.069	0.184	0.276
J-100	303.4	467290	4781946	0.069	0.184	0.276	0.069	0.184	0.276
J-105	305.0	467358	4781690	0.069	0.184	0.276	0.069	0.184	0.276
J-110	305.0	467742	4781274	0.069	0.184	0.276	0.069	0.184	0.276
J-115	302.4	467149	4781194	0.069	0.184	0.276	0.069	0.184	0.276
J-120	302.5	467149	4781184	0.069	0.184	0.276	0.069	0.184	0.276
J-125	300.0	466823	4781709	0.069	0.184	0.276	0.069	0.184	0.276
J-130	313.3	475544	4784973	1.039	2.755	4.132	1.039	2.755	4.132
J-135	313.1	475548	4784955	0.000	0.000	0.000	0.000	0.000	0.000
J-140	304.6	467537	4781096	0.069	0.184	0.276	0.069	0.184	0.276
J-145	305.0	467614	4781106	0.069	0.184	0.276	0.069	0.184	0.276
J-150	300.7	467123	4782254	0.069	0.184	0.276	0.069	0.184	0.276
J-155	301.0	467144	4782257	0.069	0.184	0.276	0.069	0.184	0.276
J-160	302.8	467194	4781726	0.069	0.184	0.276	0.069	0.184	0.276
J-165	297.3	466553	4782638	0.069	0.184	0.276	0.069	0.184	0.276
J-170	297.5	466601	4782588	0.069	0.184	0.276	0.069	0.184	0.276
J-175	315.0	475499	4785285	0.000	0.000	0.000	0.000	0.000	0.000
J-180	315.0	475503	4785261	0.000	0.000	0.000	0.000	0.000	0.000
J-185	300.0	466742	4781548	0.069	0.184	0.276	0.069	0.184	0.276
J-190	298.0	466554	4782512	0.069	0.184	0.276	0.069	0.184	0.276
J-195	314.5	475530	4785095	0.000	0.000	0.000	0.000	0.000	0.000
J-200	314.2	475533	4785063	0.000	0.000	0.000	0.000	0.000	0.000
J-205	303.6	467274	4781400	0.069	0.184	0.276	0.069	0.184	0.276
J-210	305.0	467470	4781481	0.069	0.184	0.276	0.069	0.184	0.276
J-215	300.9	467074	4781824	0.069	0.184	0.276	0.069	0.184	0.276
J-220	305.0	467775	4781063	0.069	0.184	0.276	0.069	0.184	0.276
J-225	300.7	467006	4781654	0.069	0.184	0.276	0.069	0.184	0.276
J-230	300.1	466994	4781687	0.069	0.184	0.276	0.069	0.184	0.276
J-235	301.5	467092	4781688	0.069	0.184	0.276	0.069	0.184	0.276
J-240	301.2	467058	4781675	0.069	0.184	0.276	0.069	0.184	0.276
J-245	302.5	467209	4782545	0.069	0.184	0.276	0.069	0.184	0.276
J-250	302.5	467152	4781139	0.069	0.184	0.276	0.069	0.184	0.276
J-255	300.0	466766	4781802	0.069	0.184	0.276	0.396	1.048	1.573
J-260	300.0	466805	4781808	0.069	0.184	0.276	0.069	0.184	0.276
J-265	302.7	467189	4781184	0.069	0.184	0.276	0.069	0.184	0.276
J-270	300.0	466902	4781713	0.069	0.184	0.276	0.069	0.184	0.276
J-275	300.0	466907	4781672	0.069	0.184	0.276	0.069	0.184	0.276
J-280	305.0	467822	4781759	0.069	0.184	0.276	0.392	1.039	1.558
J-285	305.0	467794	4781659	0.069	0.184	0.276	0.069	0.184	0.276
J-290	315.0	475355	4785263	0.000	0.000	0.000	0.000	0.000	0.000
J-295	315.0	475398	4785269	0.000	0.000	0.000	0.000	0.000	0.000
J-300	300.8	467083	4781752	0.069	0.184	0.276	0.069	0.184	0.276
J-305	301.8	467132	4781759	0.069	0.184	0.276	0.069	0.184	0.276
J-310	305.0	467728	4781379	0.069	0.184	0.276	0.069	0.184	0.276
J-315	302.2	467100	4781188	0.069	0.184	0.276	0.069	0.184	0.276
J-320	301.6	467109	4781999	0.069	0.184	0.276	0.069	0.184	0.276
J-325	301.5	467107	4782051	0.069	0.184	0.276	0.069	0.184	0.276
J-330	304.1	467326	4781452	0.069	0.184	0.276	0.069	0.184	0.276
J-335	300.7	467092	4782179	0.069	0.184	0.276	0.069	0.184	0.276

Model Junction	Elevation (mASL)	X (m)	Y (m)	Existing (2020)			20 Year		
				Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Demand (L/s)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Demand (L/s)
J-340	301.4	467155	4782188	0.069	0.184	0.276	0.069	0.184	0.276
J-345	304.9	467623	4781042	0.069	0.184	0.276	0.069	0.184	0.276
J-350	304.4	467545	4781032	0.069	0.184	0.276	0.069	0.184	0.276
J-355	301.5	467254	4782202	0.069	0.184	0.276	0.069	0.184	0.276
J-360	305.7	467913	4781492	0.069	0.184	0.276	0.069	0.184	0.276
J-365	304.5	467266	4781747	0.069	0.184	0.276	0.069	0.184	0.276
J-370	304.8	467337	4781763	0.069	0.184	0.276	0.069	0.184	0.276
J-375	304.2	467306	4781844	0.069	0.184	0.276	0.069	0.184	0.276
J-380	315.0	475672	4785286	0.000	0.000	0.000	0.000	0.000	0.000
J-385	315.0	475591	4785276	0.000	0.000	0.000	0.000	0.000	0.000
J-390	300.0	466888	4781819	0.069	0.184	0.276	0.069	0.184	0.276
J-395	304.6	467466	4781318	0.069	0.184	0.276	0.069	0.184	0.276
J-400	304.5	467478	4781234	0.069	0.184	0.276	0.069	0.184	0.276
J-405	299.3	466737	4782400	0.069	0.184	0.276	0.069	0.184	0.276
J-410	300.0	466727	4781682	0.069	0.184	0.276	0.396	1.048	1.573
J-415	315.0	475611	4785124	0.000	0.000	0.000	0.000	0.000	0.000
J-420	303.5	467381	4781016	0.069	0.184	0.276	0.069	0.184	0.276
J-425	303.7	467369	4781102	0.069	0.184	0.276	0.069	0.184	0.276
J-430	300.0	466715	4782085	0.069	0.184	0.276	0.069	0.184	0.276
J-435	300.0	466642	4782129	0.069	0.184	0.276	0.069	0.184	0.276
J-440	303.5	467289	4781293	0.069	0.184	0.276	0.069	0.184	0.276
J-445	315.0	475462	4785546	0.000	0.000	0.000	0.000	0.000	0.000
J-450	315.0	475475	4785457	0.000	0.000	0.000	0.000	0.000	0.000
J-455	301.4	467221	4782455	0.069	0.184	0.276	0.069	0.184	0.276
J-460	302.5	467137	4781286	0.069	0.184	0.276	0.069	0.184	0.276
J-465	305.0	467644	4781901	0.069	0.184	0.276	0.069	0.184	0.276
J-470	315.0	475567	4785470	0.000	0.000	0.000	0.000	0.000	0.000
J-475	304.9	467631	4781994	0.069	0.184	0.276	0.069	0.184	0.276
J-480	302.6	467193	4780989	0.069	0.184	0.276	0.069	0.184	0.276
J-485	302.7	467170	4781080	0.069	0.184	0.276	0.069	0.184	0.276
J-490	302.7	467124	4781380	0.069	0.184	0.276	0.069	0.184	0.276
J-495	305.0	467531	4781582	0.069	0.184	0.276	0.069	0.184	0.276
J-500	302.0	467371	4782084	0.069	0.184	0.276	0.069	0.184	0.276
J-505	300.6	467099	4782427	0.069	0.184	0.276	0.069	0.184	0.276
J-510	300.8	467357	4782215	0.069	0.184	0.276	0.069	0.184	0.276
J-515	305.0	467678	4781671	0.069	0.184	0.276	0.069	0.184	0.276
J-520	305.0	467574	4781656	0.069	0.184	0.276	0.069	0.184	0.276
J-525	315.0	475371	4785441	0.000	0.000	0.000	0.000	0.000	0.000
J-530	305.0	467534	4781760	0.069	0.184	0.276	0.069	0.184	0.276
J-535	303.9	467614	4782116	0.069	0.184	0.276	0.069	0.184	0.276
J-540	315.0	475730	4785166	0.000	0.000	0.000	0.000	0.000	0.000
J-545	314.0	475673	4784971	0.000	0.000	0.000	0.000	0.000	0.000
J-550	303.1	467596	4782246	0.069	0.184	0.276	0.994	2.633	3.950
J-555	303.6	467342	4781204	0.069	0.184	0.276	0.069	0.184	0.276
J-560	300.0	466942	4782096	0.069	0.184	0.276	0.069	0.184	0.276
J-565	300.0	467020	4782224	0.069	0.184	0.276	0.069	0.184	0.276
J-570	247.8	460268	4778597	0.000	0.000	0.000	0.000	0.000	0.000
J-575	300.0	466966	4781878	0.069	0.184	0.276	0.069	0.184	0.276
J-580	268.3	463667	4780849	0.000	0.000	0.000	0.000	0.000	0.000
J-585	302.8	467430	4783434	0.069	0.184	0.276	0.069	0.184	0.276
J-590	270.0	463899	4779229	0.000	0.000	0.000	0.000	0.000	0.000
J-595	306.7	468524	4780993	0.069	0.184	0.276	0.069	0.184	0.276
J-600	309.8	473536	4784330	0.000	0.000	0.000	0.000	0.000	0.000
J-605	312.2	469458	4783730	0.000	0.000	0.000	0.000	0.000	0.000
J-610	311.7	475388	4785003	0.000	0.000	0.000	0.000	0.000	0.000
J-615	312.3	475561	4784868	0.000	0.000	0.000	0.000	0.000	0.000
J-620	310.2	475586	4784653	0.000	0.000	0.000	0.000	0.000	0.000
J-625	301.3	467085	4782523	0.069	0.184	0.276	0.069	0.184	0.276
J-630	300.0	466434	4782257	0.069	0.184	0.276	1.128	2.989	4.483
J-635	300.0	466341	4781351	0.069	0.184	0.276	0.069	0.184	0.276
J-640	303.6	467511	4782854	0.069	0.184	0.276	0.069	0.184	0.276
J-645	310.0	471364	4784005	0.000	0.000	0.000	0.000	0.000	0.000
J-650	310.4	474986	4784840	0.000	0.000	0.000	0.000	0.000	0.000
J-655	303.0	467275	4781001	0.069	0.184	0.276	0.069	0.184	0.276
J-660	302.7	467175	4781017	0.069	0.184	0.276	0.069	0.184	0.276
J-665	302.5	467127	4781083	0.069	0.184	0.276	0.069	0.184	0.276
J-670	303.0	467233	4781082	0.069	0.184	0.276	0.069	0.184	0.276

Model Junction	Elevation (mASL)	X (m)	Y (m)	Existing (2020)			20 Year		
				Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Demand (L/s)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Demand (L/s)
J-675	305.2	467946	4781576	0.069	0.184	0.276	0.069	0.184	0.276
J-680	295.0	465892	4781178	0.000	0.000	0.000	0.000	0.000	0.000
J-685	269.6	463710	4780856	0.000	0.000	0.000	0.000	0.000	0.000
J-690	270.9	463725	4780824	0.000	0.000	0.000	0.000	0.000	0.000
J-695	272.5	463847	4780844	0.000	0.000	0.000	0.000	0.000	0.000
J-700	305.1	467830	4781554	0.069	0.184	0.276	0.069	0.184	0.276
J-705	313.2	475538	4784969	0.000	0.000	0.000	0.000	0.000	0.000
J-710	313.1	475538	4784958	0.000	0.000	0.000	0.000	0.000	0.000
J-715	313.0	475539	4784953	0.000	0.000	0.000	0.000	0.000	0.000
J-720	313.1	475538	4784963	0.000	0.000	0.000	0.000	0.000	0.000
J-725	313.3	475547	4784969	0.000	0.000	0.000	0.000	0.000	0.000
J-730	315.0	475662	4785481	0.000	0.000	0.000	0.000	0.000	0.000
J-735	313.0	475528	4784968	0.000	0.000	0.000	0.000	0.000	0.000
J-740	312.9	475528	4784963	0.000	0.000	0.000	0.000	0.000	0.000
J-745	312.9	475528	4784958	0.000	0.000	0.000	0.000	0.000	0.000
J-750	312.8	475528	4784953	0.000	0.000	0.000	0.000	0.000	0.000
J-755	312.4	475428	4785026	0.000	0.000	0.000	0.000	0.000	0.000
J-760	314.3	475535	4785068	0.000	0.000	0.000	0.000	0.000	0.000
J-765	313.2	475547	4784963	0.000	0.000	0.000	0.000	0.000	0.000
J-770	312.9	475516	4784968	0.000	0.000	0.000	0.000	0.000	0.000
J-775	312.8	475516	4784963	0.000	0.000	0.000	0.000	0.000	0.000
J-780	312.7	475516	4784953	0.000	0.000	0.000	0.000	0.000	0.000
J-785	312.7	475516	4784958	0.000	0.000	0.000	0.000	0.000	0.000
J-790	305.0	467705	4781474	0.069	0.184	0.276	0.069	0.184	0.276
J-795	300.0	466684	4782031	0.069	0.184	0.276	0.069	0.184	0.276
J-800	300.0	466915	4781621	0.069	0.184	0.276	0.069	0.184	0.276
J-805	300.0	466877	4781985	0.069	0.184	0.276	0.069	0.184	0.276
J-810	304.7	467406	4781520	0.069	0.184	0.276	0.069	0.184	0.276
J-815	304.6	467290	4781744	0.069	0.184	0.276	0.069	0.184	0.276
J-820	304.7	467491	4781837	0.069	0.184	0.276	0.069	0.184	0.276
J-825	302.7	467162	4781931	0.069	0.184	0.276	0.069	0.184	0.276
J-830	300.0	466842	4782333	0.069	0.184	0.276	0.069	0.184	0.276
J-835	300.0	466790	4782366	0.069	0.184	0.276	0.069	0.184	0.276
J-840	299.7	466903	4782540	0.069	0.184	0.276	0.069	0.184	0.276
J-845	298.5	466881	4782695	0.069	0.184	0.276	0.069	0.184	0.276
J-850	298.8	466874	4782741	0.069	0.184	0.276	0.069	0.184	0.276
J-855	300.0	466069	4782481	0.069	0.184	0.276	2.469	6.543	9.815
J-860	300.1	467101	4782726	0.069	0.184	0.276	0.069	0.184	0.276
J-865	300.8	467189	4782739	0.069	0.184	0.276	0.069	0.184	0.276
J-870	301.8	466997	4782553	0.069	0.184	0.276	0.069	0.184	0.276
J-875	300.2	467000	4782474	0.069	0.184	0.276	0.069	0.184	0.276
J-880	302.3	467063	4782616	0.069	0.184	0.276	0.069	0.184	0.276
J-885	300.8	467183	4782784	0.069	0.184	0.276	0.069	0.184	0.276
J-890	301.3	467267	4782750	0.069	0.184	0.276	0.069	0.184	0.276
J-895	302.0	467408	4782771	0.069	0.184	0.276	0.069	0.184	0.276
J-900	304.1	467520	4782788	0.069	0.184	0.276	0.994	2.633	3.950
J-905	302.8	467423	4783456	0.069	0.184	0.276	0.069	0.184	0.276
J-910	301.3	467389	4783754	0.069	0.184	0.276	0.069	0.184	0.276
J-915	298.5	466817	4783369	0.069	0.184	0.276	0.069	0.184	0.276
J-920	300.5	467060	4783403	0.069	0.184	0.276	0.069	0.184	0.276
J-925	299.0	467024	4783657	0.069	0.184	0.276	0.069	0.184	0.276
J-930	305.5	467947	4781682	0.069	0.184	0.276	0.069	0.184	0.276
J-935	305.8	468003	4781425	0.069	0.184	0.276	0.069	0.184	0.276
J-940	305.8	468019	4781457	0.069	0.184	0.276	0.392	1.039	1.558
J-945	306.2	468198	4781394	0.069	0.184	0.276	0.069	0.184	0.276
J-950	304.6	468102	4781381	0.069	0.184	0.276	0.069	0.184	0.276
J-955	305.9	468203	4781188	0.069	0.184	0.276	0.526	1.394	2.091
J-960	301.7	467285	4782671	0.069	0.184	0.276	0.417	1.106	1.659
J-965	302.0	467412	4782692	0.069	0.184	0.276	0.417	1.106	1.659
J-970	314.0	469965	4780087	0.069	0.184	0.276	0.069	0.184	0.276
J-975	310.0	470037	4779698	0.069	0.184	0.276	0.069	0.184	0.276
Total				11.233	29.768	44.652	18.991	50.326	75.489

Appendix D

Wastewater Modelling Details



LEGEND

- MANHOLES

Note: MH numerical IDs are from GIS inventory. Alphabetical IDs have been arbitrarily assigned for MHs not having IDs in GIS.

SETTLEMENT BOUNDARY

100mm FORCEMAIN

200mm FORCEMAIN

300mm FORCEMAIN

SANITARY MAINS (mm)

375

300

250

200

75

50

UNKNOWN

TOWNSHIP OF LUCAN BIDDULPH

URBAN MUNICIPAL SERVICING MASTER PLAN

LUCAN WASTEWATER SYSTEM

DATE
JAN. 07, 2021

SCALE
AS SHOWN

PROJECT No.
20158

FIGURE No.

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN - EXISTING DEVELOPMENT
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.10 people/unit
High Density (Apartments)	150 units per hectare @	1.70 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A1	Francis Street	137	136	137	136	0.77	0.77	2.75	5		14	14	4.4	0.15	0.23	0.42	200	0.48	0.013	22.82	0.73	76.2		0.37	301.83	301.46	1.9
A2	Francis Street	136	134	136	134	1.12	1.89	2.75	8		22	36	4.3	0.38	0.59	1.07	200	0.42	0.013	21.31	0.68	90.2	0.03	0.38	301.43	301.05	5.0
A3	Francis Street	176	134	176	134	1.05	1.05	2.75	8		22	22	4.4	0.21	0.37	0.64	200	0.54	0.013	24.17	0.77	117.3		0.64	301.69	301.05	2.6
A4	Clarence Street	134	133	134	133	0.53	3.47	2.75	5		14	72	4.3	0.69	1.17	2.05	200	0.44	0.013	21.66	0.69	111.9	0.03	0.49	301.02	300.54	9.5
A5	Saintsbury Line	273	283	273	172	1.10	1.10	2.75	3		8	8	4.4	0.22	0.14	0.40	200	0.52	0.013	23.67	0.75	149.7		0.78	301.780	301.00	1.7
A6	Saintsbury Line	284	283	173	172	0.48	0.48	2.75	4		11	11	4.4	0.10	0.19	0.31	200	0.50	0.013	23.19	0.74	116.4		0.58	302.08	301.50	1.3
		283	85	172	85	0.00	1.58	2.75	0		0	19	4.4	0.32	0.32	0.70	200	0.38	0.013	20.11	0.64	22.6		0.08	300.93	300.85	3.5
A7	Saintsbury Line	135	85	135	85	0.46	0.46	2.75	3		8	8	4.4	0.09	0.14	0.25	200	0.7	0.013	27.44	0.87	69.1		0.48	301.19	300.70	0.9
A8	Saintsbury Line	139	85	139	85	0.65	0.65	2.75	7		19	19	4.4	0.13	0.32	0.50	200	0.41	0.013	21.00	0.67	100.0		0.41	301.77	301.36	2.4
A9	Wellington Street	85	133	85	133	0.26	2.95	2.75	2		6	52	4.3	0.59	0.86	1.60	200	0.39	0.013	20.48	0.65	103.3	0.03	0.40	300.66	300.26	7.8
A10	Wellington Street	133	121	133	121	0.19	6.61	2.75	1		3	127	4.2	1.32	2.04	3.69	200	0.42	0.013	21.26	0.68	85.95	0.30	0.36	300.24	299.88	17.4
A11			120		120	0.2				45	9	9	4.4		0.15	0.17											
			120		120			1.70	55		94	94	4.3		1.52	1.67											
	Richmond Street	119	120	119	120	0.99	0.99	2.75	2		6	108	4.2	0.20	1.75	2.14	200	0.40	0.013	20.74	0.66	104.2		0.42	301.782	301.37	10.3
A12	Richmond Street	120	121	120	121	0.92	1.91	2.75	6		17	125	4.2	0.38	2.01	2.63	200	0.39	0.013	20.48	0.65	64.3	0.01	0.25	301.354	301.10	12.8
	Coyne Lane	BD	BC			0.13	0.13	2.75	2		6	6	4.4	0.03	0.09	0.13	200	1.05	0.013	33.61	1.07	23.6		0.25	303.160	302.91	0.4
	Coyne Lane	BC	BB			0.17	0.30	2.75	2		6	11	4.4	0.06	0.19	0.27	200	1.65	0.013	42.13	1.34	26.0	0.02	0.43	302.890	302.46	0.6
	Coyne Lane	BB	BA			0.31	0.61	2.75	5		14	25	4.4	0.12	0.41	0.59	200	0.27	0.013	17.04	0.54	77.6	0.04	0.21	302.42	302.21	3.5
	Coyne Lane	BA	AL			0.12	0.73	2.75	2		6	30	4.4	0.15	0.50	0.71	200	0.33	0.013	18.84	0.60	77.6	0.05	0.26	302.16	301.89	3.8
A13	Coyne Lane	BD	BE	221	222	0.98	0.98	2.75	12		33	33	4.3	0.20	0.55	0.82	200	0.43	0.013	21.51	0.68	100.0		0.43	303.17	302.74	3.8
A14	Coyne Lane	BE	AQ	222	228	0.20	1.18	2.75	2		6	39	4.3	0.24	0.64	0.96	200	0.33	0.013	18.84	0.60	52.0	0.03	0.17	302.71	302.54	5.1
	Spencer Avenue	AZ	AY			0.35	0.35	2.75	4		11	11	4.4	0.07	0.19	0.28	200	0.32	0.013	18.55	0.59	22.4		0.07	304.54	304.47	1.5
	Spencer Avenue	AY	AX			0.43	0.78	2.75	8		22	33	4.3	0.16	0.55	0.77	200	0.28	0.013	17.36	0.55	56.4	0.05	0.16	304.42	304.26	4.5
	Spencer Avenue	AX	AW			0.40	1.18	2.75	8		22	55	4.3	0.24	0.90	1.25	200	0.29	0.013	17.66	0.56	59.1	0.07	0.17	304.19	304.02	7.1
	Spencer Avenue	AW	AV			0.20	1.38	2.75	3		8	63	4.3	0.28	1.04	1.44	200	0.34	0.013	19.12	0.61	52.8	0.05	0.18	303.97	303.79	7.6
	Spencer Avenue	AV	AU			0.50	1.88	2.75	8		22	85	4.3	0.38	1.39	1.94	200	0.31	0.013	18.26	0.58	72.8	#REF!	0.23	303.74	303.52	10.6
	Spencer Avenue	AU	AT			0.24	2.12	2.75	4		11	96	4.2	0.42	1.56	2.18	200	0.33	0.013	18.84	0.60	49.2	0.03	0.16	303.49	303.33	11.6
	Spencer Avenue	AT	AS			0.06	2.18	2.75	3		8	105	4.2	0.44	1.69	2.34	200	0.33	0.013	18.84	0.60	26.7	0.03	0.09	303.3	303.21	12.4
	Spencer Avenue	AS	AR			0.36	2.54	2.75	5		14	118	4.2	0.51	1.91	2.66	200	0.26	0.013	16.72	0.53	64.2	0.05	0.17	303.16	302.99	15.9
	Spencer Avenue	BG	AR			0.08	0.08	2.75	1		3	3	4.5	0.02	0.05	0.07	200	0.32	0.013	18.55	0.59	32.3		0.10	303.1	303	0.4
A15	Spencer Avenue	AR	AQ	219	228	0.49	3.11	2.75	11		30	151	4.2	0.62	2.42	3.35	200	0.33	0.013	18.84	0.60	50.6	0.03	0.17	302.71	302.54	17.8
A16	Spencer Avenue	AQ	AP	228	220	0.20	4.49	2.75	2		6	195	4.2	0.90	3.10	4.39	200	0.33	0.013	18.84	0.60	40.3	0.03	0.13	302.51	302.38	23.3
	Easement	AP	BF	220	229	0	4.49				0	195	4.2	0.90	3.10	4.39	200	0.33	0.013	18.84	0.60	100.0	0.03	0.33	302.35	302.02	23.3
	Easement	BF	35	229	35	0	4.49				0	195	4.2	0.90	3.10	4.39	200	0.33	0.013	18.84	0.60	35.3	0.03	0.12	301.99	301.87	23.3
A17	Richmond Street	285	35	177	35	0.50	0.50			45	23	23	4.4	0.10	0.38	0.53	200	0.61	0.013	25.62	0.82	45.0		0.27	302.19	301.91	2.1
A18	Richmond Street	35	34	35	34	1.99	6.98			45	90	308	4.1	1.40	4.80	6.81	200	0.40	0.013	20.74	0.66	90.0	0.01	0.36	301.90	301.54	32.8
	Richmond Street	34	272	34		0	6.98				0	308	4.1	1.40	4.80	6.81	200	0.40	0.013	20.74	0.66	55.0	0.03	0.22	-0.03	-0.25	32.8
	Richmond Street	272	271		271	0	6.98				0	308	4.1	1.40	4.80	6.81	200	0.40	0.013	20.74	0.66	55.0	0.03	0.22	301.51	301.29	32.8
A19			270		270	0.54				45	25	25	4.4		0.41	0.45											
	Richmond Street	271	270	271	270	1.01	7.99	2.75	4		11	344	4.1	1.60	5.32	7.61	200	0.54	0.013	24.10	0.77	88.1	0.01	0.48	301.28	300.81	31.6
A20	Richmond Street	270	121	270	121	1.10	9.09	2.75	10		28	371	4.0	1.82	5.73	8.30	200	0.40	0.013	20.74	0.66	88.4		0.35	300.81	300.46	40.0
A21	Elm Street	121	38	121	38	0.23	17.84	2.75	1		3	625	3.9	3.57	9.37	14.23	200	0.38	0.013	20.11	0.64	109.4	0.03	0.41	299.85	299.44	70.8
A22	Fairview Place	140	39	140	39	0.75	0.75	2.75	6		17	17	4.4	0.15	0.28	0.47	200	0.47	0.013	22.49	0.72	63.7		0.30	300.38	300.08	2.1
A23	Saintsbury Line	276	178	276	178	0.41	0.41	2.75	2		6	6	4.4	0.08	0.09	0.19	200	0.73	0.013	27.97	0.89	55.0		0.40	301.08	300.68	0.7
A24	Langford Drive	178	146	178	146	0.58	0.99	2.75	3		8	14	4.4	0.20	0.23	0.47	200	0.43	0.013	21.46	0.68	67.7	0.08	0.29	300.60	300.31	2.2
A25	Langford Drive	146	39	146	39	1.11	2.10	2.75	5		14	28	4.4	0.42	0.46	0.97	200	0.37	0.013	19.95	0.64	87.5		0.32	300.28	299.96	4.8

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.10 people/unit
High Density (Apartments)	150 units per hectare @	1.70 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A26	Langford Drive	39	147	39	147	0.56	3.41	2.75	5		14	41	4.3	0.68	0.68	1.50	200	0.35	0.013	19.40	0.62	63.7	0.03	0.22	299.93	299.71	7.7
A27	Langford Drive	147	38	147	38	0.53	3.94	2.75	4		11	52	4.3	0.79	0.86	1.81	200	0.39	0.013	20.48	0.65	64.6	0.03	0.25	299.68	299.43	8.9
A28	Langford Drive	141	38	141	38	0.86	0.86	2.75	5		14	14	4.4	0.17	0.23	0.44	200	0.55	0.013	24.32	0.77	63.4		0.35	300.21	299.86	1.8
	Elm Street	38	122	38	122	0	22.64				0	691	3.9	4.53	10.29	16.30	200	0.52	0.013	23.65	0.75	32.6	0.02	0.17	299.42	299.25	68.9
A29	Watson Street	245	246	245	246	1.04	1.04	2.75	11		30	30	4.4	0.21	0.50	0.78	200	0.70	0.013	27.44	0.87	80.4		0.56	301.90	301.34	2.9
A30	Watson Street	246	247	246	247	0.17	1.21	2.75	2		6	36	4.3	0.24	0.59	0.92	200	0.40	0.013	20.74	0.66	41.0	0.01	0.16	301.33	301.16	4.4
A31	Radcliffe Crescent	247	248	247	248	0.51	1.72	2.75	8		22	58	4.3	0.34	0.95	1.42	200	0.40	0.013	20.74	0.66	64.9	0.02	0.26	301.14	300.88	6.9
A32	Radcliffe Crescent	248	249	248	249	0.25	1.97	2.75	2		6	63	4.3	0.39	1.04	1.57	200	0.40	0.013	20.74	0.66	20.0	0.01	0.08	300.87	300.79	7.6
A33	Radcliffe Crescent	249	250	249	250	0.11	2.08	2.75	1		3	66	4.3	0.42	1.08	1.65	200	0.40	0.013	20.74	0.66	23.0	0.01	0.09	300.78	300.69	7.9
A34	Radcliffe Crescent	247	253	247	253	0.37	0.37	2.75	8		22	22	4.4	0.07	0.37	0.49	200	0.70	0.013	27.44	0.87	71.0		0.50	301.66	301.16	1.8
A35	Radcliffe Crescent	182	253	182	253	1.02	1.02	2.75	11		30	30	4.4	0.20	0.50	0.78	200	0.70	0.013	27.44	0.87	125.0		0.88	302.04	301.16	2.8
A36	Radcliffe Crescent	253	252	253	252	0.52	1.91	2.75	8		22	74	4.3	0.38	1.21	1.75	200	0.43	0.013	21.53	0.69	64.9	0.00	0.28	301.16	300.88	8.1
A37	Radcliffe Crescent	252	251	252	251	0.15	2.06	2.75	1		3	77	4.3	0.41	1.26	1.84	200	0.40	0.013	20.74	0.66	20.0	0.01	0.08	300.87	300.79	8.8
A38	Radcliffe Crescent	251	250	251	250	0.19	2.25	2.75	2		6	83	4.3	0.45	1.34	1.97	200	0.45	0.013	22.10	0.70	19.0	0.01	0.09	300.78	300.70	8.9
	Easement	250	43	250	43	0.00	4.33				0	149	4.2	0.87	2.38	3.57	200	0.40	0.013	20.74	0.66	122	0.02	0.49	300.68	300.19	17.2
	Easement	43	44	43	44	0.00	4.33				0	149	4.2	0.87	2.38	3.57	200	0.50	0.013	23.19	0.74	8.2	0.00	0.04	300.19	300.15	15.4
A39	Saintsbury Line	180	181	180	181	1.45	1.45	2.75	6		17	17	4.4	0.29	0.28	0.62	200	0.50	0.013	23.19	0.74	120.0		0.60	302.18	301.58	2.7
A40		181	273	181	163	1.03	2.48	2.75	4		11	28	4.4	0.50	0.46	1.05	200	0.70	0.013	27.44	0.87	120.0	0.01	0.84	301.57	300.73	3.8
A41	Nicoline Avenue	273	274	163	164	1.44	3.92	2.75	3		8	36	4.3	0.78	0.59	1.51	200	0.40	0.013	20.61	0.66	98.5	0.04	0.39	300.69	300.30	7.3
A42	Nicoline Avenue	274	44	164	44	1.67	5.59	2.75	4		11	47	4.3	1.12	0.77	2.08	200	0.39	0.013	20.59	0.66	90.0	0.01	0.35	300.29	299.93	10.1
A43	Nicoline Avenue	44	41	44	41	1.03	10.95	2.75	5		14	209	4.1	2.19	3.31	6.05	200	0.42	0.013	21.26	0.68	67.5	0.01	0.28	299.92	299.64	28.4
A44	John Street	235	52	235	52	0.49	0.49	2.75	5		14	14	4.4	0.10	0.23	0.36	200	0.72	0.013	27.81	0.89	88.5		0.64	300.80	300.16	1.3
	John Street	52	47	52	47	0.00	0.49				0	14	4.4	0.10	0.23	0.36	200	0.50	0.013	23.19	0.74	8.2	0.00	0.04	300.12	300.08	1.6
A45	Nicoline Avenue	48	47	48	47	0.68	0.68	2.75	9		25	25	4.4	0.14	0.41	0.60	200	0.34	0.013	19.12	0.61	75.3		0.26	300.41	300.15	3.2
A46	Nicoline Avenue	47	46	47	46	0.25	1.42	2.75	3		8	47	4.3	0.28	0.77	1.16	200	0.34	0.013	19.12	0.61	45.7	0.01	0.16	300.15	299.99	6.1
A47	Nicoline Avenue	46	45	46	45	0.24	1.66	2.75	3		8	55	4.3	0.33	0.90	1.36	200	0.34	0.013	19.12	0.61	41.1	0.00	0.14	299.99	299.85	7.1
A48	Nicoline Avenue	45	41	45	41	1.26	2.92	2.75	3		8	63	4.3	0.58	1.04	1.78	200	0.34	0.013	19.12	0.61	50.9	0.00	0.17	299.85	299.68	9.3
A49	Elm Street	41	179	41	179	0.30	14.17	2.75	2		6	278	4.1	2.83	4.34	7.89	200	0.34	0.013	19.12	0.61	88.1	0.02	0.30	299.66	299.36	41.3
A50	Harold Court	274	61	274	61	0.92	0.92	2.75	13		36	36	4.3	0.18	0.59	0.85	200	1.00	0.013	32.80	1.04	96.0		0.96	300.57	299.61	2.6
A51	Harold Court	61	179	61	179	0.40	1.32	2.75	5		14	50	4.3	0.26	0.82	1.19	200	0.34	0.013	19.12	0.61	65.5	0.00	0.22	299.61	299.39	6.2
A52	Elm Street	179	42	179	42	0.33	15.82	2.75	1		3	330	4.1	3.16	5.12	9.11	200	0.34	0.013	19.12	0.61	31.1	0.03	0.11	299.36	299.25	47.6
	Elm Street	42	40	42	40	0	15.82				0	330	4.1	3.16	5.12	9.11	200	0.34	0.013	19.12	0.61	25.9	0.00	0.09	299.25	299.16	47.6
A53	Elm Street	40	122	40	122	0.33	16.15	2.75	2		6	336	4.1	3.23	5.20	9.27	200	0.34	0.013	19.12	0.61	86.9	0.00	0.30	299.16	298.87	48.5
A54	Easement	122	148	122	148	1.41	40.20				0	1027	3.8	8.04	14.87	25.21	300	0.53	0.013	70.40	1.00	112.8	0.43	0.60	298.82	298.23	35.8
	Easement	148	64	148	64	0	40.20				0	1027	3.8	8.04	14.87	25.21	300	0.24	0.013	47.37	0.67	20.4	0.03	0.05	298.20	298.15	53.2
A55	Albert Street	123	291	123	275	0.73	0.73	2.75	9		25	25	4.4	0.15	0.41	0.61	200	1.14	0.013	35.02	1.11	63.1		0.72	300.90	300.19	1.8
A56	Albert Street	291	64	275	64	0.71	1.44	2.75	7		19	44	4.3	0.29	0.73	1.12	200	1.12	0.013	34.71	1.10	71.9	0.02	0.81	300.17	299.36	3.2
	Easement	64	62	64	62	0	41.64				0	1071	3.8	8.33	15.46	26.17	300	0.20	0.013	43.25	0.61	11.0	1.25	0.02	298.11	298.09	60.5
A57	Watson Street	244	243	244	243	0.27	0.27	2.75	3		8	8	4.4	0.05	0.14	0.21	200	0.70	0.013	27.44	0.87	35.0	0.03	0.25	300.60	300.36	0.8
A58	Watson Street	243	242	243	242	0.85	1.12	2.75	11		30	39	4.3	0.22	0.64	0.95	200	0.70	0.013	27.44	0.87	96.0	0.03	0.67	300.33	299.66	3.5
A59	Watson Street	242	240	242	240	0.98	2.10	2.75	13		36	74	4.3	0.42	1.21	1.80	200	0.40	0.013	20.74	0.66	96.0	0.03	0.38	299.64	299.25	8.7
A60	Watson Street	240	241	240	241	0.39	2.49	2.75	3		8	83	4.3	0.50	1.34	2.03	200	0.40	0.013	20.74	0.66	16.3	0.03	0.07	299.23	299.16	9.8
A61	Watson Street	241	234	241	234	0.54	3.03	2.75	6		17	99	4.2	0.61	1.61	2.43	200	0.40	0.013	20.74	0.66	92.9	0.03	0.37	299.14	298.77	11.7
A62	John Street	243	235	243	235	0.53	0.53	2.75	6		17	17	4.4	0.11	0.28	0.42	200	0.70	0.013	27.44	0.87	93.8	0.03	0.66	300.52	299.86	1.5

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.10 people/unit
High Density (Apartments)	150 units per hectare @	1.70 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A63	Joseph Street	235	236	235	236	0.93	1.46	2.75	12		33	50	4.3	0.29	0.82	1.22	200	0.60	0.013	25.41	0.81	99.0	0.03	0.59	299.84	299.25	4.8
A64	Joseph Street	236	237	236	237	0.69	2.15	2.75	9		25	74	4.3	0.43	1.21	1.81	200	0.40	0.013	20.74	0.66	81.8	0.03	0.33	299.22	298.89	8.7
A65	Joseph Street	237	234	237	234	0.26	2.41	2.75	3		8	83	4.3	0.48	1.34	2.01	200	0.40	0.013	20.74	0.66	25.8	0.03	0.10	298.87	298.77	9.7
A66	Joseph Street	238	239	238	239	0.18	0.18	2.75	2		6	6	4.4	0.04	0.09	0.14	200	0.70	0.013	27.44	0.87	17.0	0.03	0.12	299.08	298.96	0.5
A67	Joseph Street	239	234	239	234	0.11	0.29	2.75	1		3	8	4.4	0.06	0.14	0.22	200	0.70	0.013	27.44	0.87	24.5	0.03	0.17	298.94	298.77	0.8
	Watson Street	234	NPS	234	PS	0.0	5.73				0	190	4.2	1.15	3.01	4.57	200	0.40	0.013	20.74	0.66	10.0	0.03	0.04	298.74	298.70	22.1
	Easement	NPS	232	PS	232	0.0	5.73				0	847	3.8	1.15	12.44	14.94	200	0.40	0.013	20.74	0.66	43.7		0.17	300.33	300.15	72.0
	Easement	232	50	232	50	0.0	5.73				0	847	3.8	1.15	12.44	14.94	250	0.30	0.013	32.57	0.66	45.7		0.14	300.09	299.95	45.9
A68	Nicoline Avenue	51	50	51	50	0.39	0.39	2.75	4		11	11	4.4	0.08	0.19	0.29	200	0.34	0.013	19.12	0.61	39.6		0.13	300.12	299.98	1.5
A69	Nicoline Avenue	48	49	48	49	0.72	0.72	2.75	10		28	28	4.4	0.14	0.46	0.66	200	0.34	0.013	19.12	0.61	76.2		0.26	300.43	300.17	3.5
A70	Nicoline Avenue	49	50	49	50	0.44	1.16	2.75	5		14	41	4.3	0.23	0.68	1.01	200	0.34	0.013	19.12	0.61	54.9	0.00	0.19	300.17	299.98	5.3
A71	Kleinfeldt Avenue	50	56	50	56	0.37	7.65	2.75	4		11	910	3.8	1.53	13.30	16.31	250	0.28	0.013	31.47	0.64	71.0	0.03	0.20	299.95	299.75	51.8
A72	Kleinfeldt Avenue	56	55	56	55	0.71	8.36	2.75	10		28	938	3.8	1.67	13.67	16.88	250	0.28	0.013	31.47	0.64	81.4	0.00	0.23	299.75	299.53	53.6
A73	Kleinfeldt Avenue	55	54	55	54	0.25	8.61	2.75	3		8	946	3.8	1.72	13.79	17.06	250	0.25	0.013	29.73	0.61	47.2	0.25	0.12	299.28	299.16	57.4
A74	Kleinfeldt Avenue	53	54	53	54	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	0.30	0.013	17.96	0.57	29.6		0.09	299.25	299.16	1.2
A75	Marlene Street	54	57	54	57	0.62	9.52	2.75	8		22	976	3.8	1.90	14.19	17.71	250	0.25	0.013	29.73	0.61	76.2	0.02	0.19	299.14	298.95	59.6
A76	Marlene Street	57	58	57	58	0.51	10.03	2.75	6		17	993	3.8	2.01	14.42	18.06	250	0.25	0.013	29.73	0.61	77.1	0.02	0.19	298.94	298.74	60.8
A77	Harold Court	59	60	59	60	1.19	1.19	2.75	13		36	36	4.3	0.24	0.59	0.91	200	1.00	0.013	32.80	1.04	56.7		0.57	301.66	301.09	2.8
A78	Albert Street	60	65	60	65	0.24	1.43	2.75	2		6	41	4.3	0.29	0.68	1.07	200	2.00	0.013	46.38	1.48	61.0	0.07	1.22	301.03	299.81	2.3
A79	Albert Street	65	58	65	58	0.46	1.89	2.75	6		17	58	4.3	0.38	0.95	1.46	200	2.00	0.013	46.38	1.48	52.4	0.02	1.05	299.79	298.74	3.1
A80	Albert Street	58	294	58	199	0.08	12.00				0	1051	3.8	2.40	15.19	19.35	200	0.75	0.013	28.40	0.90	40.2	0.02	0.30	298.73	298.43	68.1
A81	Albert Street	294	63	199	63	0.32	12.32	2.75	2		6	1056	3.8	2.46	15.26	19.50	200	0.20	0.013	14.67	0.47	48.8	0.01	0.10	298.42	298.32	133.0
		63	62	63	62	0	12.32				0	1056	3.8	2.46	15.26	19.50	200	0.20	0.013	14.67	0.47	12.2	0.00	0.02	298.32	298.29	133.0
	Easement	62	198	62	198	0	53.96				0	2127	3.6	10.79	28.96	43.73	300	0.20	0.013	43.25	0.61	60.0	0.00	0.12	298.09	297.97	101.1
	Easement	198	197	198	197	0	53.96				0	2127	3.6	10.79	28.96	43.73	300	0.25	0.013	48.35	0.68	71.3	0.34	0.18	297.95	297.77	90.4
	Easement	197	33	197	33	0	53.96				0	2127	3.6	10.79	28.96	43.73	300	0.19	0.013	42.15	0.60	111.9	0.02	0.21	297.76	297.54	103.7
A82	Princess Street	138	67	138	67	1.05	1.05	2.75	9		25	25	4.4	0.21	0.41	0.69	200	1.30	0.013	37.40	1.19	91.7		1.19	301.81	300.61	1.8
A83	Princess Street	67	66	67	66	1.19	2.24	2.75	9		25	50	4.3	0.45	0.82	1.39	200	1.28	0.013	37.05	1.18	91.7	0.48	1.17	300.14	298.96	3.8
A84	Princess Street	66	33	66	33	0.37	2.61	2.75	2		6	55	4.3	0.52	0.90	1.57	200	0.77	0.013	28.69	0.91	75.3	0.04	0.58	298.93	298.35	5.5
	Easement	33	142	33	142	0	56.57				0	2182	3.6	11.31	29.63	45.04	300	0.33	0.013	55.55	0.79	102.7	0.83	0.34	297.52	297.18	81.1
A85	Water Street	70	125	70	125	0.56	0.56	2.75	5		14	14	4.4	0.11	0.23	0.38	200	0.53	0.013	23.88	0.76	71.9		0.38	298.31	297.93	1.6
A86	William Street	125	142	125	142	0.47	1.03	2.75	5		14	28	4.4	0.21	0.46	0.73	200	0.47	0.013	22.49	0.72	61.3	0.03	0.29	297.90	297.61	3.2
A87	William Street	142	128	142	128	0.37	57.97	2.75	2		6	2215	3.6	11.59	30.04	45.80	300	0.33	0.013	55.55	0.79	38.4	0.45	0.13	297.16	297.03	82.4
A88	William Street	126	127	126	127	1.03	1.03			45	47	47	4.3	0.21	0.77	1.08	200	1.02	0.013	33.12	1.05	63.4		0.65	300.22	299.58	3.2
A89	William Street	127	128	127	128	0.69	1.72	2.75	8		22	69	4.3	0.34	1.13	1.62	200	2.21	0.013	48.76	1.55	74.7	0.03	1.65	299.55	297.90	3.3
A90	Frank Street	128	68	128	68	0.59	60.28	2.75	7		19	2303	3.5	12.06	31.11	47.49	375	0.36	0.013	105.20	0.95	73.8	0.91	0.27	296.98	296.72	45.1
A91	Frank Street		69		69	0.68				45	31	31	4.4		0.51	0.57	375										
A91	Frank Street	68	69	68	69	1.26	61.54	2.75	7		19	2353	3.5	12.31	31.72	48.43	375	0.25	0.013	87.67	0.79	88.4	0.03	0.22	296.69	296.47	55.2
A92	Frank Street	69	23	69	23	0.45	61.99	2.75	7		19	2372	3.5	12.40	31.96	48.79	300	0.25	0.013	48.35	0.68	89.9	0.03	0.22	296.44	296.21	100.9
A93	Spencer Avenue	AP	AO	220	226	0.28	0.28	2.75	6		17	17	4.4	0.06	0.28	0.37	200	0.33	0.013	18.84	0.60	64.1		0.21	302.61	302.40	1.9
A94	Spencer Avenue	AO	AN	226	227	0.80	1.08	2.75	2		6	22	4.4	0.22	0.37	0.64	200	0.33	0.013	18.84	0.60	29.0	0.03	0.10	302.37	302.27	3.4
A95	Spencer Avenue	AN	AM	227	224	0.49	1.57	2.75	5		14	36	4.3	0.31	0.59	1.00	200	0.33	0.013	18.84	0.60	34.9	0.03	0.12	302.24	302.13	5.3
A96	Spencer Avenue	AM	AL	224	223	0.40	1.97	2.75	5		14	50	4.3	0.39	0.82	1.33	200	0.33	0.013	18.84	0.60	49.7	0.03	0.16	302.10	301.94	7.1
A97	Spencer Avenue	AL	AK	223	225	0.79	3.49	2.75	10		28	107.25	4.2	0.70	1.73	2.68	200	0.33	0.013	18.84	0.60	93.2	0.03	0.31	301.91	301.60	14.2
A98	Spencer Avenue	AK	AJ	225	213	0.56	4.05	2.75	5		14	121	4.2	0.81	1.95	3.04	200	0.33	0.013	18.84	0.60	70.8	0.03	0.23	301.57	301.33	16.1
A99	Spencer Avenue	AJ	AI	213	218	0.05	4.10	2.75	5		14	135	4.2	0.82	2.16	3.28	200	0.33	0.013	18.84	0.60	20.2	0.03	0.07	301.30	301.24	17.4
A100	Spencer Avenue	AI	230	218	230	0.13	4.23	2.75	5		14	149	4.2	0.85	2.38	3.55	200	0.33	0.013	18.84	0.60	73.1	0.03	0.24	301.21	300.97	18.8

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.10 people/unit
High Density (Apartments)	150 units per hectare @	1.70 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A101	Saintsbury Line	230	231	230	231	0.56	4.79				0	149	4.2	0.96	2.38	3.67	200	0.23	0.013	15.79	0.50	98.6	0.05	0.23	300.92	300.69	23.2
	Saintsbury Line	231	86	231	86	0	4.79				0	149	4.2	0.96	2.38	3.67	200	0.25	0.013	16.40	0.52	11.0	0.03	0.03	300.66	300.63	22.4
	Saintsbury Line	86	84	86	84																				300.60	300.44	
A102	Saintsbury Line	86	87	86	87	1.26	6.05	2.75	3		8	157	4.2	1.21	2.51	4.09	200	0.56	0.013	24.54	0.78	76.3	0.03	0.43	300.60	300.17	16.7
A103	Saintsbury Line	174	87	174	87	0.72	0.72	2.75	2		6	6	4.4	0.14	0.09	0.26	200	0.68	0.013	27.05	0.86	45.5		0.31	300.46	300.15	1.0
	Market Street	87	83	87	83	0	6.77				0	162	4.2	1.35	2.59	4.34	200	0.25	0.013	16.40	0.52	19.3	0.05	0.05	300.10	300.05	26.5
A104	Alice Street	175	84	175	84	0.86	0.86	2.75	9		25	25	4.4	0.17	0.41	0.64	200	0.52	0.013	23.65	0.75	82.3		0.43	300.87	300.44	2.7
A105	Saintsbury Line	84	83	84	83	0.11	0.97	2.75	1		3	28	4.4	0.19	0.46	0.72	200	0.33	0.013	18.84	0.60	87.5	0.08	0.29	300.36	300.10	3.8
A106	Market Street	83	153	83	153	0.72	8.46	2.75	5		14	204	4.1	1.69	3.22	5.41	200	0.41	0.013	21.08	0.67	77.5	0.05	0.32	300.05	299.73	25.6
A107	Market Street	153	22	153	22	0.96	9.42	2.75	7		19	223	4.1	1.88	3.51	5.94	200	0.36	0.013	19.81	0.63	82.2	0.03	0.30	299.70	299.40	30.0
A108	Market Street	22	152	22	152	1.16	10.58	2.75	7		19	242	4.1	2.12	3.81	6.51	200	0.41	0.013	21.07	0.67	94.5	0.03	0.39	299.37	298.98	30.9
A109	Market Street	152	4	152	4	1.31	11.89				0	242	4.1	2.38	3.81	6.80	200	0.95	0.013	31.97	1.02	90.5	0.02	0.86	298.9599957	298.10	21.3
A110	Duchess Avenue	18	156	18	156	1.87	1.87	2.75	13		36	36	4.3	0.37	0.59	1.06	200	1.00	0.013	32.86	1.05	122.5		1.23	300.85	299.62	3.2
A111	Duchess Avenue	156	19	156	19	0.42	2.29	2.75	2		6	41	4.3	0.46	0.68	1.25	200	0.40	0.013	20.74	0.66	37.2	0.05	0.15	299.57	299.42	6.0
A112	Duchess Avenue	19	20	19	20	0.47	2.76	2.75	2		6	47	4.3	0.55	0.77	1.46	200	0.53	0.013	23.88	0.76	52.7	0.02	0.28	299.39	299.11	6.1
A113	Lewis Avenue	21	20	21	20	0.95	0.95	2.75	8		22	22	4.4	0.19	0.37	0.61	200	0.62	0.013	25.83	0.82	84.7		0.53	299.63	299.10	2.4
A114	Duchess Avenue	20	5	20	5	0.67	4.38	2.75	2		6	74	4.3	0.88	1.21	2.30	200	0.45	0.013	22.00	0.70	106.1	0.02	0.48	299.09	298.61	10.4
A115	Beech Street	275	5	165	5	0.72	0.72	2.75	6		17	17	4.4	0.14	0.28	0.46	200	0.60	0.013	25.41	0.81	73.2		0.44	299.44	299.00	1.8
A116			189		189	0.56		1.70	150		255	255															
	Beech Street	5	189	5	189	0.99	6.09	2.75	2		6	351	4.0	1.22	5.43	7.31	200	0.34	0.013	19.18	0.61	63.4	0.41	0.22	298.59	298.37	38.1
A117	Beech Street	189	4	189	4	0.29	6.38	2.75	2		6	357	4.0	1.28	5.51	7.47	200	0.39	0.013	20.40	0.65	62.5	0.02	0.24	298.35	298.11	36.6
A118	Market Street	4	151	4	151	0.77	19.04	2.75	5		14	613	3.9	3.81	9.19	14.30	200	0.41	0.013	20.99	0.67	63.5	0.03	0.26	298.07	297.81	68.1
A119		151	150	151	150	0.31	19.35	2.75	3		8	621	3.9	3.87	9.30	14.49	200	0.43	0.013	21.54	0.69	64.9	0.02	0.28	297.7899979	297.51	67.3
A120	Alice Street	154	155	154	155	1.06	1.06	2.75	9		25	25	4.4	0.21	0.41	0.69	200	0.34	0.013	19.12	0.61	82.6		0.28	301.47	301.19	3.6
A121	Alice Street	155	295	155	183	0.35	1.41	2.75	3		8	33	4.3	0.28	0.55	0.91	200	0.39	0.013	20.48	0.65	41.1	0.03	0.16	301.16	301.00	4.5
A122	Alice Street	295	124	183	124	1.12	2.53	2.75	10		28	61	4.3	0.51	0.99	1.65	200	0.30	0.013	17.96	0.57	109.7	0.03	0.33	300.97	300.64	9.2
A123	Alice Street	124	185	124	185	0.68	3.21			45	31	91	4.3	0.64	1.49	2.34	200	0.38	0.013	20.19	0.64	37.8	0.00	0.14	300.64	300.50	11.6
	Easement	185	186	185	186	0	3.21				0	91	4.3	0.64	1.49	2.34	200	0.54	0.013	24.10	0.77	66.1		0.36	300.50	300.14	9.7
A124	Easement	186	184	186	184	0.68	3.89			45	31	122	4.2	0.78	1.97	3.02	200	1.38	0.013	38.53	1.23	73.2	0.03	1.01	300.11	299.10	7.8
A125	Easement	184	187	184	187	0.64	4.53			45	29	151	4.2	0.91	2.42	3.66	200	1.21	0.013	36.08	1.15	55.2	0.03	0.67	299.07	298.40	10.1
A126	Easement	187	150	187	150	0.56	5.09			45	25	177	4.2	1.02	2.81	4.22	200	1.29	0.013	37.18	1.18	44.8	0.02	0.58	298.38	297.80	11.3
A127	Market Street	150	23	150	23	0.06	24.50				0	798	3.9	4.90	11.76	18.33	200	0.42	0.013	21.26	0.68	40.5	0.03	0.17	297.78	297.61	86.2
A128	Oak Street	23	24	23	24	0.09	86.58	2.75	2		6	3175	3.4	17.32	41.49	64.69	375	0.49	0.013	122.73	1.11	28.6	1.40	0.14	296.21	296.07	52.7
A129	Duchess Avenue	31	149	31	149	1.22	1.22	2.75	11		30	30	4.4	0.24	0.50	0.82	200	0.41	0.013	21.00	0.67	94.4		0.39	299.75	299.36	3.9
A130	Oak Street	149	25	149	25	0.41	1.63	2.75	3		8	39	4.3	0.33	0.64	1.06	200	2.57	0.013	52.58	1.67	63.1	0.06	1.62	299.31	297.68	2.0
A131	Butler Street	144	145	144	145	0.75	0.75	2.75	4		11	11	4.4	0.15	0.19	0.37	200	0.41	0.013	21.00	0.67	69.5		0.28	297.31	297.02	1.8
A132		145	25	145	25	0.22	0.97	2.75	1		3	14	4.4	0.19	0.23	0.47	200	0.43	0.013	21.43	0.68	72.2	0.02	0.31	297.00	296.69	2.2
A133	Oak Street	25	24	25	24	0.15	2.75	2.75	2		6	58	4.3	0.55	0.95	1.65	200	0.71	0.013	27.64	0.88	35.4	0.07	0.25	296.62	296.37	6.0
A134	Easement	24	188	24	188	0.33	89.66	2.75	3		8	3241	3.4	17.93	42.26	66.21	375	0.38	0.013	108.36	0.98	47.9	0.33	0.18	296.04	295.86	61.1
A135	Easement	188	191	188	191	1.40	91.06	2.75	10		28	3269	3.4	18.21	42.58	66.87	375	0.20	0.013	78.21	0.71	94.8	0.03	0.19	295.83	295.64	85.5
A136	Easement	191	30	191	30	0.39	91.45	2.75	4		11	3280	3.4	18.29	42.71	67.10	375	0.22	0.013	82.42	0.75	96.9	0.03	0.21	295.61	295.39	81.4
A137	Water Street	71	72	71	72	0.29	0.29	2.75	2		6	6	4.4	0.06	0.09	0.17	200	0.50	0.013	23.19	0.74	24.3		0.12	297.67	297.55	0.7
A138	Water Street	72	73	72	73	0.60	0.89	2.75	7		19	25	4.4	0.18	0.41	0.65	200	0.48	0.013	22.72	0.72	62.5	0.03	0.30	297.52	297.22	2.9
A139	Water Street	73	74	73	74	0.32	1.21	2.75	4		11	36	4.3	0.24	0.59	0.92	200	0.41	0.013	21.00	0.67	56.1	0.05	0.23	297.17	296.94	4.4

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.10 people/unit
High Density (Apartments)	150 units per hectare @	1.70 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A140	Easement	196	74	196	74	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	1.16	0.013	35.33	1.12	46.6		0.54	297.48	296.94	0.6
A141	Water Street	74	158	74	158	0.36	1.86	2.75	4		11	55	4.3	0.37	0.90	1.40	200	0.47	0.013	22.41	0.71	56.7	0.03	0.26	296.91	296.65	6.3
A142	Main Street	158	282	158	171	0.74	2.60	2.75	5		14	69	4.3	0.52	1.13	1.81	200	0.59	0.013	25.13	0.80	109.1	0.03	0.64	296.62	295.97	7.2
A143	Elizabeth Street	79	78	79	78	0.74	0.74	2.75	2		6	6	4.4	0.15	0.09	0.27	200	0.50	0.013	23.19	0.74	15.0		0.08	297.92	297.85	1.1
A144	Elizabeth Street	78	77	78	77	0.84	1.58	2.75	9		25	30	4.4	0.32	0.50	0.90	200	0.38	0.013	20.22	0.64	98.5	0.03	0.37	297.82	297.44	4.5
A145	Margaret Street	81	76	81	76	0.73	0.73	2.75	8		22	22	4.4	0.15	0.37	0.56	200	0.57	0.013	24.85	0.79	82.9		0.48	298.39	297.91	2.3
		272	75	272	75	0	0										200	1.40	0.013	38.81	1.24	44.1		0.62	298.87	298.25	0.0
A146	George Street	75	76	75	76	0.62	0.62	2.75	4		11	11	4.4	0.12	0.19	0.34	200	0.26	0.013	16.69	0.53	42.5	0.05	0.11	298.20	298.09	2.0
A147	George Street	76	77	76	77	0.52	1.87	2.75	6		17	50	4.3	0.37	0.82	1.31	200	0.43	0.013	21.41	0.68	107.9	0.28	0.46	297.81	297.35	6.1
A148	George Street	77	129	77	129	0.56	4.01	2.75	6		17	96	4.2	0.80	1.56	2.60	200	0.35	0.013	19.32	0.61	85.1	0.03	0.30	297.41	297.12	13.5
	George Street	129	296	129		0	4.01	2.75	0		0	96	4.2	0.80	1.56	2.60	200	0.49	0.013	23.01	0.73	85.5	0.03	0.42	-0.03	-0.45	11.3
A149	George Street	296	282		171	1.26	5.27	2.75	4		11	107	4.2	1.05	1.73	3.07	200	0.49	0.013	23.01	0.73	85.5	0.03	0.42	297.08	296.66	13.3
A150	Main Street	37	280	37	169	12.47	12.47			45	165	165	4.2	2.49	2.63	5.64	200	0.51	0.013	23.42	0.75	108.5		0.55	298.86	298.30	24.1
A151	Main Street	280	288	169		1.02	13.49	2.75	4		11	176	4.2	2.70	2.80	6.05	200	0.44	0.013	21.73	0.69	108.8	0.01	0.48	298.29	297.82	27.8
		288	281		170	0	13.49	2.75	0		0	176	4.2	2.70	2.80	6.05	200	0.44	0.013	21.73	0.69	108.8	0.01	0.48	297.81	297.33	27.8
A152	Main Street	281	36	170	36	2.10	15.59	2.75	8		22	198	4.1	3.12	3.14	6.88	200	0.43	0.013	21.51	0.68	107.3	0.00	0.46	297.82	297.35	32.0
A153	Main Street	36	282	36	171	1.59	17.18	2.75	4		11	209	4.1	3.44	3.31	7.42	200	0.41	0.013	21.00	0.67	108.2	0.00	0.44	297.35	296.91	35.3
A154	Stanley Street	282	30	171	30	0.36	25.41	2.75	2		6	391	4.0	5.08	6.01	12.20	200	0.46	0.013	22.24	0.71	74.1	1.03	0.34	295.88	295.54	54.8
A155	Stanley Street	30	26	30	26	0.23	117.09	2.75	1		3	3673	3.4	23.42	47.23	77.71	375	0.28	0.013	92.78	0.84	57.6	0.18	0.16	295.36	295.20	83.8
A156	Butler Street	277	278	166	167	0.52	0.52	2.75	1		3	3	4.5	0.10	0.05	0.17	200	0.38	0.013	20.22	0.64	92.0		0.35	298.304712	297.95	0.8
A157	Butler Street	278	279	167	168	0.83	1.35	2.75	3		8	11	4.4	0.27	0.19	0.50	200	0.47	0.013	22.53	0.72	93.0	0.06	0.44	297.89	297.46	2.2
A158	Butler Street	279	143	168	143	0.72	2.07	2.75	3		8	19	4.4	0.41	0.32	0.81	200	0.37	0.013	19.95	0.64	89.3	0.02	0.33	297.43	297.10	4.1
A159	Easement	195	143	195	143	0.68	0.68	2.75	3		8	8	4.4	0.14	0.14	0.30	200	1.00	0.013	32.80	1.04	48.9		0.49	297.66	297.17	0.9
A160	Butler Street	143	28	143	28	1.17	3.92	2.75	5		14	41	4.3	0.78	0.68	1.61	200	0.47	0.013	22.49	0.72	87.2	0.02	0.41	297.08	296.67	7.2
A161	Butler Street	28	27	28	27	0.72	4.64	2.75	3		8	50	4.3	0.93	0.82	1.92	200	0.43	0.013	21.51	0.68	84.7	0.03	0.36	296.64	296.28	8.9
A162	Butler Street	27	26	27	26	1.11	5.75	2.75	6		17	66	4.3	1.15	1.08	2.45	200	0.38	0.013	20.22	0.64	92.7	0.02	0.35	296.25	295.90	12.1
A163	Stanley Street	26	DNE	26	190	0.46	123.30	2.75	2		6	3745	3.4	24.66	48.04	79.97	375	0.37	0.013	106.94	0.97	70.4	0.73	0.26	295.17	294.91	74.8
A164	Stanley Street	DNE	130	190	130	0.94	124.24	2.75	3		8	3753	3.4	24.85	48.13	80.28	375	0.40	0.013	110.89	1.00	82.9	0.03	0.33	294.88	294.54	72.4
A165	Kent Avenue	82	3	82	3	0.99	0.99	2.75	6		17	17	4.4	0.20	0.28	0.52	200	0.31	0.013	18.14	0.58	65.3		0.20	297.45	297.25	2.9
A166	Kent Avenue	3	2	3	2	0.86	1.85	2.75	4		11	28	4.4	0.37	0.46	0.91	200	0.29	0.013	17.72	0.56	65.1	0.01	0.19	297.24	297.05	5.1
A167	Kent Avenue	2	1	2	1	2.41	4.26	2.75	5		14	41	4.3	0.85	0.68	1.69	200	0.63	0.013	25.99	0.83	97.1	0.07	0.61	296.98	296.37	6.5
A168	Kent Avenue	1	162	1	162	0.83	5.09	2.75	6		17	58	4.3	1.02	0.95	2.16	200	0.25	0.013	16.53	0.53	90.7	0.03	0.23	296.34	296.11	13.1
A169	Kent Avenue	162	161	162	161	0.67	5.76	2.75	5		14	72	4.3	1.15	1.17	2.55	250	0.25	0.013	29.73	0.61	87.6	0.63	0.22	295.48	295.26	8.6
A170	Kent Avenue	161	160	161	160	1.00	6.76	2.75	9		25	96	4.2	1.35	1.56	3.21	250	0.25	0.013	29.73	0.61	87.8	0.01	0.22	295.25	295.03	10.8
A171	Kent Avenue	160	130	160	130	0.56	7.32	2.75	2		6	102	4.2	1.46	1.65	3.42	250	0.25	0.013	29.73	0.61	88.2	0.06	0.22	294.97	294.75	11.5
A172	Easement	130	131	130	131	0.85	132.41	2.10	75		158	4012	3.3	26.48	51.06	85.30	375	0.22	0.013	81.30	0.74	68.3	0.24	0.15	294.51	294.36	104.9
A173	Easement	131	132	131	132	1.07	133.48	2.10	75		158	4170	3.3	26.70	52.83	87.48	375	0.35	0.013	103.43	0.94	67.1	0.03	0.23	294.33	294.10	84.6
A174	Beech Street	6	17	6	17	0.32	0.32	2.75	3		8	8	4.4	0.06	0.14	0.22	200	1.50	0.013	40.17	1.28	16.0		0.24	297.11	296.87	0.6
A175	Beech Street	16	17	16	17	1.10	1.10	2.75	6		17	17	4.4	0.22	0.28	0.55	200	1.00	0.013	32.80	1.04	77.0		0.77	297.87	297.10	1.7
A176	Gibson Crescent	17	7	17	7	0.43	1.85	2.75	6		17	41	4.3	0.37	0.68	1.16	200	0.77	0.013	28.78	0.92	64.5	0.29	0.50	296.81	296.31	4.0
A177	Gibson Crescent	7	157	7	157	0.60	2.45	2.75	8		22	63	4.3	0.49	1.04	1.68	200	0.77	0.013	28.78	0.92	64.5	0.01	0.50	296.30	295.80	5.8
A178	Gibson Crescent	157	8	157	8	0.48	2.93	2.75	6		17	80	4.3	0.59	1.30	2.08	200	0.73	0.013	28.02	0.89	52.0	0.05	0.38	295.75	295.37	7.4
A179	Gibson Crescent		9		8	0.39		1.70	150		255	255															
A179	Gibson Crescent	8	9	8	9	0.81	3.74	2.75	6		17	351	4.0	0.75	5.43	6.80	200	1.00	0.013	32.80	1.04	53.2	0.02	0.53	295.35	294.82	20.7
A180	Willow Avenue	15	14	15	14	0.62	0.62	2.75	6		17	17	4.4	0.12	0.28	0.44	200	3.89	0.013	64.69	2.06	60.4		2.35	298.93	296.58	0.7
A181	Willow Avenue	14	10	14	10	0.56	1.18	2.75	6		17	33	4.3	0.24	0.55	0.86	200	0.97	0.013	32.30	1.03	62.8	0.03	0.61	296.55	295.94	2.7

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.10 people/unit
High Density (Apartments)	150 units per hectare @	1.70 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A182	Wilberforce Public School		12		12	4.12	4.12				33	33	4.3	0.82	0.54	1.50											
	Gibson Crescent	13	12	13	12	0.52	4.64	2.75	6		17	49	4.3	0.93	0.81	1.91	200	2.15	0.013	48.05	1.53	60.4		1.30	298.82	297.52	4.0
A183	Gibson Crescent	12	11	12	11	0.71	5.35	2.75	8		22	71	4.3	1.07	1.16	2.45	200	0.63	0.013	25.95	0.83	64.3	0.03	0.40	297.49	297.09	9.5
A184	Gibson Crescent	11	10	11	10	0.59	5.94	2.75	6		17	88	4.3	1.19	1.42	2.87	200	1.12	0.013	34.77	1.11	100.3	0.03	1.13	297.06	295.93	8.3
A185	Gibson Crescent	10	9	10	9	0.33	7.45	2.75	3		8	129	4.2	1.49	2.07	3.92	200	1.56	0.013	40.99	1.30	63.4	0.04	0.99	295.90	294.91	9.6
	Easement	9	32	9	32	0	11.19				0	480	4.0	2.24	7.30	10.49	200	0.30	0.013	17.96	0.57	45.4	0.05	0.14	294.85	294.72	58.4
	Easement	32	290	32		0	11.19				0	480	4.0	2.24	7.30	10.49	200	0.31	0.013	18.29	0.58	100.3	0.03	0.31	294.69	294.38	57.4
	Easement	290	132		132		11.19				0	480	4.0	2.24	7.30	10.49	200	0.31	0.013	18.29	0.58	100.3	0.03	0.31	294.35	294.03	57.4
	Easement	132	289	132	192	0	144.67				0	4650	3.3	28.93	58.14	95.79	375	0.37	0.013	106.94	0.97	88.7	0.31	0.33	294.07	293.74	89.6
	Easement	289	29	192	29	0	144.67				0	4650	3.3	28.93	58.14	95.79	375	0.25	0.013	88.02	0.80	75.3	0.18	0.19	293.56	293.37	108.8
A186	Chestnut Street	194	193	194	193	1.18	1.18	2.75	3		8	8	4.4	0.24	0.14	0.41	200	1.42	0.013	39.08	1.24	74.8		1.06	297.03	295.97	1.1
A187	Walnut Street	193	265	193	265	0.11	1.29				0	8	4.4	0.26	0.14	0.44	200	1.27	0.013	36.96	1.18	57.0	0.075	0.72	295.89	295.17	1.2
A188	Walnut Street	260	261	260	261	0.94	0.94	2.75	9		25	25	4.4	0.19	0.41	0.66	200	0.40	0.013	20.74	0.66	74.9		0.30	295.46	295.16	3.2
A189	Walnut Street	261	265	261	265	0.70	1.64	2.75	8		22	47	4.3	0.33	0.77	1.21	200	0.40	0.013	20.74	0.66	74.8	0.03	0.30	295.14	294.84	5.8
A190	Walnut Grove Place	265	264	265	264	0.26	3.19	2.75	3		8	63	4.3	0.64	1.04	1.84	200	0.40	0.013	20.74	0.66	51.6	0.08	0.21	294.76	294.56	8.9
A191	Walnut Grove Place	264	263	264	263	0.33	3.52	2.75	4		11	74	4.3	0.70	1.21	2.11	200	0.40	0.013	20.74	0.66	48.4	0.07	0.19	294.48	294.29	10.2
A192	Walnut Street	260	255	260	255	0.86	0.86	2.75	9		25	25	4.4	0.17	0.41	0.64	200	0.43	0.013	21.51	0.68	75.3		0.32	295.68	295.36	3.0
A193	Walnut Street	254	255	254	255	0.29	1.15	2.75	2		6	30	4.4	0.23	0.50	0.81	200	0.61	0.013	25.62	0.82	23.3		0.14	295.51	295.36	3.1
	Easement	255	258	255	258	0	2.01				0	55	4.3	0.40	0.90	1.44	200	0.52	0.013	23.65	0.75	100	0.08	0.52	295.29	294.77	6.1
A194	Walnut Grove Place	256	257	256	257	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	0.61	0.013	25.62	0.82	26.7		0.16	295.01	294.85	0.8
A195	Walnut Grove Place	257	258	257	258	0.31	0.6	2.75	4		11	19	4.4	0.12	0.32	0.49	200	0.52	0.013	23.65	0.75	28.0	0.05	0.15	294.80	294.65	2.1
A196	Walnut Grove Place	258	259	258	259	0.70	3.31	2.75	9		25	99	4.2	0.66	1.61	2.49	200	0.40	0.013	20.74	0.66	66.2	0.03	0.26	294.63	294.36	12.0
A197	Walnut Grove Place	259	262	259	262	0.87	4.18	2.75	12		33	132	4.2	0.84	2.12	3.25	200	0.40	0.013	20.74	0.66	82.5	0.03	0.33	294.34	294.01	15.7
A198	Walnut Grove Place	262	263	262	263	0.80	4.98	2.75	10		28	160	4.2	1.00	2.55	3.90	200	0.40	0.013	20.74	0.66	76.3	0.03	0.31	293.98	293.68	18.8
	Easement	263	266	263	266	0	8.50				0	234	4.1	1.70	3.68	5.92	200	0.40	0.013	20.74	0.66	70.7	0.05	0.28	293.63	293.35	28.5
	Easement	266	29	266	29	0	8.50				0	234	4.1	1.70	3.68	5.92	200	0.40	0.013	20.74	0.66	16.1	0.08	0.06	293.26	293.20	28.5
	Easement	29	CPS	29	CPS	0	153.17					4883	3.3	30.63	60.70	100.47											
A19	Street B					0.75	0.75	2.10	50		105	176															
A20	Street B					1.24	1.99	2.75	43		118	295															
A18	Street B	AH	AG	RC21	RC20	0.59	2.58	3.50	12		42	337	4.1	0.52	5.22	6.31	200	0.60	0.013	25.41	0.81	103.0	0.03	0.62	300.655	299.745	24.8
A23	Street B	AG	AF	RC20	RC19	0.43	3.01	2.10	25		53	389	4.0	0.60	5.99	7.25	200	0.50	0.013	23.19	0.74	20.8	0.03	0.10	299.695	299.383	31.3
A24	Street B	AF	S	RC19	RC3	0.39	3.40	3.50	8		28	417	4.0	0.68	6.39	7.78	200	0.40	0.013	20.74	0.66	72.3	0.05	0.29	299.333	298.249	37.5
A1	Street A	V	U	RC1	RC2	0.75	0.75	3.50	17		60	60	4.3	0.15	0.98	1.24	200	0.60	0.013	25.41	0.81	80.4	0.03	0.48	300.493	299.769	4.9
A1a	Street A	U	T	RC2	RC2a	0.77	1.52	3.50	12		42	102	4.2	0.30	1.64	2.14	200	0.50	0.013	23.19	0.74	80.4	0.03	0.40	299.719	298.995	9.2
A2	Street A	T	S	RC2a	RC3	0.66	2.18	3.50	14		49	151	4.2	0.44	2.41	3.13	200	0.50	0.013	23.19	0.74	80.4	0.03	0.40	298.895	298.222	13.5
A3	Street A	S	R	RC3	RC4	0.49	6.07	3.50	6		21	589	3.9	1.21	8.85	11.07	200	0.40	0.013	20.74	0.66	72.3	0.05	0.29	298.172	297.525	53.4
A31	Beech Street	AE	AD	RC29	RC31	0.66	0.66	3.50	12		42	42	4.3	0.13	0.69	0.91	200	0.45	0.013	22.00	0.70	73.8	0.03	0.33	300.311	299.979	4.1
A32	Beech Street	AD	R	RC31	RC4	0.67	1.33	3.50	12		42	84	4.3	0.27	1.37	1.80	200	2.99	0.013	56.71	1.81	78.5	0.05	2.35	299.879	297.530	3.2
A4a	Street A	R	Q	RC4	RC5	0.46	7.86	3.50	7		25	697	3.9	1.57	10.37	13.14	200	0.56	0.013	24.54	0.78	89.8	0.03	0.50	297.425	296.905	53.5
A25	Street C/F	AC	AB	RC23	RC24	0.77	0.77	3.50	7		25	25	4.4	0.15	0.41	0.62	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	298.704	298.574	2.8
A26	Street C/F	AB	Z	RC24	RC25	0.85	1.62	3.50	10		35	60	4.3	0.32	0.98	1.43	200	0.45	0.013	22.00	0.70	91.7	0.05	0.41	298.524	298.111	6.5
A27	Street C/F	Z	Y	RC25	RC26	0.47	2.09	3.50	4		14	74	4.3	0.42	1.20	1.78	200	0.45	0.013	22.00	0.70	15.0	0.05	0.07	298.061	297.994	8.1
A28	Street C/F	Y	X	RC26	RC27	0.74	2.83	3.50	9		32	105	4.2	0.57	1.70	2.49	200	0.40	0.013	20.74	0.66	101.7	0.05	0.41	297.944	297.537	12.0
A29	Street C/F	X	W	RC27	RC28	0.42	3.25	3.50	4		14	119	4.2	0.65	1.92	2.83	200	0.40	0.013	20.74	0.66	20.8	0.05	0.08	297.487	297.404	13.6
A30	Street C/F	W	Q	RC28	RC5	0.71	3.96	3.50	10		35	154	4.2	0.79	2.46	3.58	200	0.51	0.013	23.42	0.75	85.5	0.05	0.44	297.354	296.905	15.3
A5	Street A	Q	P	RC5	RC6	0.77	12.59	3.50	12		42	893	3.8	2.52	13.07	17.15	200	0.40	0.013	20.74	0.66	101.3	0.05	0.41	296.880	296.475	82.7
A6	Street A	P	O	RC6	RCCAP	0.91	13.50	3.50	14		49	942	3.8	2.70	13.73	18.08	200	1.81	0.013	44.13	1.40	99.4	0.05	1.80	296.435	294.636	41.0
A6	Street A	O	B	RCCAP	RC7	0.00	13.50	3.50	0		0	942	3.8	2.70	13.73	18.08	200	0.40	0.013	20.74	0.66	21.4	0.05	0.09	294.636	294.550	87.1

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.10 people/unit
High Density (Apartments)	150 units per hectare @	1.70 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A7	Street E	A	B	RC18	RC7	0.26	0.26	3.50	4		14	14	4.4	0.05	0.24	0.32	200	0.60	0.013	25.41	0.81	43.1	0.05	0.26	294.893	294.635	1.2
A8	Street E	B	C	RC7	RC9	0.57	14.33	3.50	10		35	991	3.8	2.87	14.39	18.99	200	0.68	0.013	27.05	0.86	86.3	0.05	0.59	294.610	294.160	70.2
A9	Street E	C	D	RC9	RC10	0.65	14.98	3.50	12		42	1033	3.8	3.00	14.96	19.75	200	0.64	0.013	26.24	0.84	71.9	0.05	0.46	294.110	293.650	75.3
A10	Street E	D	E	RC10	RC11	0.29	15.27	3.50	1		4	1037	3.8	3.05	15.01	19.87	200	0.64	0.013	26.24	0.84	40.5	0.05	0.26	293.600	293.340	75.7
		E	F																								
A11	Street E	F	G	RC11	RC12	0.20	15.47	3.50	1		4	1040	3.8	3.09	15.05	19.96	200	0.57	0.013	24.76	0.79	28.1	0.05	0.16	293.310	293.150	80.6
A12	Street E	G	H	RC12	RC40	0.05	15.52	3.50	0		0	1040	3.8	3.10	15.05	19.97	200	0.62	0.013	25.83	0.82	36.3	0.05	0.23	293.070	292.924	77.3
A13	Walnut Street	193	M	RC39	RC17	0.12	0.12	3.50	0		0	0	4.5	0.02	0.00	0.03	200	0.40	0.013	20.74	0.66	30.0	0.05	0.12	296.631	296.511	0.1
A14	Walnut Street	N	M	RC30	RC17	0.16	0.16	3.50	6		21	21	4.4	0.03	0.35	0.42	200	0.35	0.013	19.40	0.62	104.9	0.05	0.37	296.907	296.540	2.2
A15	Street E	M	L	RC17	RC16	0.55	0.83	3.50	6		21	42	4.3	0.17	0.69	0.95	200	2.52	0.013	52.07	1.66	29.0	0.05	0.73	296.443	294.950	1.8
A16	Street E	L	K	RC16	RC15	0.50	1.33	3.50	6		21	63	4.3	0.27	1.03	1.43	200	0.60	0.013	25.41	0.81	29.0	0.05	0.17	294.868	294.508	5.6
A17	Street E	K	H	RC15	RC40	0.06	1.39	3.50	0		0	63	4.3	0.28	1.03	1.44	200	0.61	0.013	25.62	0.82	29.0	0.05	0.18	294.464	294.244	5.6
	Street E	H	I	RC40	RC41	0.00	16.91	3.50	0		0	1076	3.8	3.38	15.53	20.81	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.895	292.844	94.6
	Street E	I	J	RC41	RC38	0.00	16.91	3.50	0		0	1076	3.8	3.38	15.53	20.81	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.791	292.761	94.6
	Street E	J		RC38	RCPS	0.00	150.76	3.50	0		0	3368	3.4	30.15	43.73	81.27	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.125	292.115	369.4
A4b	Beech Street		R	RCSTUB	RC4	0.09	0.09	3.50	0		0	0	4.5	0.02	0.00	0.02	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	297.620	297.530	0.1
	Walnut Grove	Force Main	J	MH 2 EX	RC38	6.41	6.41					192															
	Town of Lucan		J		RC38	110.00	116.41					2100															

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN - EXISTING + APPROVED DEVELOPMENT
TOWNSHIP OF LUCAN BIDDULPH

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Project: 20158
Date: June 2021

Location						Area		Population						Peak Cumulative Sewage Flow			Sewer Design					Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A1	Francis Street	137	136	137	136	0.77	0.77	2.75	5		14	14	4.4	0.15	0.23	0.42	200	0.48	0.013	22.82	0.73	76.2		0.37	301.83	301.46	1.9
A2	Francis Street	136	134	136	134	1.12	1.89	2.75	8		22	36	4.3	0.38	0.59	1.07	200	0.42	0.013	21.31	0.68	90.2	0.03	0.38	301.43	301.05	5.0
A3	Francis Street	176	134	176	134	1.05	1.05	2.75	8		22	22	4.4	0.21	0.37	0.64	200	0.54	0.013	24.17	0.77	117.3		0.64	301.69	301.05	2.6
A4	Clarence Street	134	133	134	133	0.53	3.47	2.75	5		14	72	4.3	0.69	1.17	2.05	200	0.44	0.013	21.66	0.69	111.9	0.03	0.49	301.02	300.54	9.5
A5	Saintsbury Line	273	283	273	172	1.10	1.10	2.75	3		8	8	4.4	0.22	0.14	0.40	200	0.52	0.013	23.67	0.75	149.7		0.78	301.780	301.00	1.7
A6	Saintsbury Line	284	283	173	172	0.48	0.48	2.75	4		11	11	4.4	0.10	0.19	0.31	200	0.50	0.013	23.19	0.74	116.4		0.58	302.08	301.50	1.3
		283	85	172	85	0.00	1.58	2.75	0		0	19	4.4	0.32	0.32	0.70	200	0.38	0.013	20.11	0.64	22.6		0.08	300.93	300.85	3.5
A7	Saintsbury Line	135	85	135	85	0.46	0.46	2.75	3		8	8	4.4	0.09	0.14	0.25	200	0.7	0.013	27.44	0.87	69.1		0.48	301.19	300.70	0.9
A8	Saintsbury Line	139	85	139	85	0.65	0.65	2.75	7		19	19	4.4	0.13	0.32	0.50	200	0.41	0.013	21.00	0.67	100.0		0.41	301.77	301.36	2.4
A9	Wellington Street	85	133	85	133	0.26	2.95	2.75	2		6	52	4.3	0.59	0.86	1.60	200	0.39	0.013	20.48	0.65	103.3	0.03	0.40	300.66	300.26	7.8
A10	Wellington Street	133	121	133	121	0.19	6.61	2.75	1		3	127	4.2	1.32	2.04	3.69	200	0.42	0.013	21.26	0.68	85.95	0.30	0.36	300.24	299.88	17.4
A11			120		120	0.20				45	9	9	4.4		0.15	0.17											
			120		120			1.60	55		88	88	4.3		1.43	1.57											
	Richmond Street	119	120	119	120	0.99	0.99	2.75	2		6	103	4.2	0.20	1.66	2.05	200	0.40	0.013	20.74	0.66	104.2		0.42	301.782	301.37	9.9
A12	Richmond Street	120	121	120	121	0.92	1.91	2.75	6		17	119	4.2	0.38	1.92	2.53	200	0.39	0.013	20.48	0.65	64.3	0.01	0.25	301.354	301.10	12.4
	Coyne Lane	BD	BC			0.13	0.13	2.75	2		6	6	4.4	0.03	0.09	0.13	200	1.05	0.013	33.61	1.07	23.6		0.25	303.160	302.91	0.4
	Coyne Lane	BC	BB			0.17	0.30	2.75	2		6	11	4.4	0.06	0.19	0.27	200	1.65	0.013	42.13	1.34	26.0	0.02	0.43	302.890	302.46	0.6
DDa	Future Dev	S8	S7			1.50	1.50	2.75	45		124	124	4.2	0.30	1.99	2.52	200	0.33	0.013	18.84	0.60	38.9					
	Street B	S7	S9			0.00	1.50	2.75	0		0	124	4.2	0.30	1.99	2.52	200	0.33	0.013	18.84	0.60	13.0					
	Street B	S15	S14			0.27	0.27	2.75	8		22	146	4.2	0.05	2.34	2.63	200	0.55	0.013	24.32	0.77	69.5					
	Street B	S14	S9			0.30	0.57	2.75	9		25	171	4.2	0.11	2.72	3.11	200	0.5	0.013	23.19	0.74	76.8					
	Stuart Avenue	S9	S13			0.00	2.07	2.75	0		0	171	4.2	0.41	2.72	3.44	200	0.33	0.013	18.84	0.60	34.9					
	Stuart Avenue	S13	BB			0.10	2.17	2.75	3		8	179	4.2	0.43	2.84	3.60	200	0.4	0.013	20.74	0.66	46.3					
	Stuart Avenue	BB	BA			0.31	2.78	2.75	5		14	204	4.1	0.56	3.22	4.16	200	0.27	0.013	17.04	0.54	77.6	0.04	0.21	302.42	302.21	24.4
	Stuart Avenue	BA	AL			0.12	2.90	2.75	2		6	209	4.1	0.58	3.31	4.27	200	0.33	0.013	18.84	0.60	77.6	0.05	0.26	302.16	301.89	22.7
A13	Coyne Lane	BD	BE	221	222	0.98	0.98	2.75	12		33	33	4.3	0.20	0.55	0.82	200	0.43	0.013	21.51	0.68	100.0		0.43	303.17	302.74	3.8
A14	Coyne Lane	BE	AQ	222	228	0.20	1.18	2.75	2		6	39	4.3	0.24	0.64	0.96	200	0.33	0.013	18.84	0.60	52.0	0.03	0.17	302.71	302.54	5.1
	Spencer Avenue	AZ	AY			0.35	0.35	2.75	4		11	11	4.4	0.07	0.19	0.28	200	0.32	0.013	18.55	0.59	22.4		0.07	304.54	304.47	1.5
	Spencer Avenue	AY	AX			0.43	0.78	2.75	8		22	33	4.3	0.16	0.55	0.77	200	0.28	0.013	17.36	0.55	56.4	0.05	0.16	304.42	304.26	4.5
	Spencer Avenue	AX	AW			0.40	1.18	2.75	8		22	55	4.3	0.24	0.90	1.25	200	0.29	0.013	17.66	0.56	59.1	0.07	0.17	304.19	304.02	7.1
DC	**Verhoog**		**AW**			**0.42**	**0.42**	**1.70**	**63**		**107**	**107**	**4.2**	**0.08**	**1.73**	**2.00**											
	Spencer Avenue	AW	AV			0.20	1.80	0.00	3		0	162	4.2	0.36	2.59	3.24	200	0.34	0.013	19.12	0.61	52.8	0.05	0.18	303.97	303.79	17.0
DDb	**Olde Clover Drive**	**S21**	**AV**			**0.17**	**0.17**	**2.75**	**5**		**14**	**14**	**4.4**	**0.03**	**0.23**	**0.29**	**200**	**0.33**	**0.013**	**18.84**	0.60	**74.4**					
	Spencer Avenue	AV	AU			0.50	2.47	2.75	8		22	198	4.1	0.49	3.14	3.99	200	0.31	0.013	18.26	0.58	72.8		0.23	303.74	303.52	21.9
	Spencer Avenue	AU	AT			0.24	2.71	2.75	4		11	209	4.1	0.54	3.30	4.23	200	0.33	0.013	18.84	0.60	49.2	0.03	0.16	303.49	303.33	22.4
	Spencer Avenue	AT	AS			0.06	2.77	2.75	3		8	217	4.1	0.55	3.43	4.38	200	0.33	0.013	18.84	0.60	26.7	0.03	0.09	303.3	303.21	23.2
	Spencer Avenue	AS	AR			0.36	3.13	2.75	5		14	231	4.1	0.63	3.64	4.69	200	0.26	0.013	16.72	0.53	64.2	0.05	0.17	303.16	302.99	28.0
DDc	**Future Dev**		**S22**			**1.60**	**1.60**	**2.75**	**48**		**132**	**132**	**4.2**	**0.32**	**2.12**	**2.69**											
	Street A	**S22**	**S21**			**0.07**	**1.67**	**2.75**	**2**		**6**	**138**	**4.2**	**0.33**	**2.21**	**2.79**	**200**	**0.65**	**0.013**	**26.44**	**0.84**	**29.8**					
	Street A	**S21**	**S20**			**0.13**	**1.80**	**2.75**	**4**		**11**	**149**	**4.2**	**0.36**	**2.38**	**3.01**	**200**	**0.33**	**0.013**	**18.84**	0.60	**49.0**					
	Street A	**S20**	**S19**			**0.20**	**2.00**	**2.75**	**6**		**17**	**165**	**4.2**	**0.40**	**2.63**	**3.34**	**200**	**0.33**	**0.013**	**18.84**	0.60	**51.0**					
	Street A	**S19**	**S16**			**0.07**	**2.07**	**2.75**	**2**		**6**	**171**	**4.2**	**0.41**	**2.72**	**3.44**	**200**	**0.33**	**0.013**	**18.84**	0.60	**64.3**					
	Street B	**S15**	**S16**			**0.27**	**0.27**	**2.75**	**8**		**22**	**22**	**4.4**	**0.05**	**0.37**	**0.46**	**200**	**0.8**	**0.013**	**29.34**	**0.93**	**68.6**					
	Street B	**S16**	**BG**			**0.03**	**2.37**	**2.75**	**1**		**3**	**195**	**4.2**	**0.47**	**3.10**	**3.93**	**200**	**0.25**	**0.013**	**16.40**	0.52	**21.6**					

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Project: 20158
Date: June 2021

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	Street B	BG	AR			0.08	2.45	2.75	1		3	198	4.1	0.49	3.14	3.99	200	0.32	0.013	18.55	0.59	32.3		0.10	303.1	303	21.5
A15	Spencer Avenue	AR	AQ	219	228	0.49	6.06	2.75	11		30	459	4.0	1.21	7.00	9.04	200	0.33	0.013	18.84	0.60	50.6	0.03	0.17	302.71	302.54	48.0
A16	Spencer Avenue	AQ	AP	228	220	0.20	7.44	2.75	2		6	503	4.0	1.49	7.63	10.04	200	0.33	0.013	18.84	0.60	40.3	0.03	0.13	302.51	302.38	53.3
	Easement	AP	BF	220	229	0.00	7.44				0	503	4.0	1.49	7.63	10.04	200	0.33	0.013	18.84	0.60	100.0	0.03	0.33	302.35	302.02	53.3
	Easement	BF	35	229	35	0.00	7.44				0	503	4.0	1.49	7.63	10.04	200	0.33	0.013	18.84	0.60	35.3	0.03	0.12	301.99	301.87	53.3
A17	Richmond Street	285	35	177	35	0.50	0.50			45	23	23	4.4	0.10	0.38	0.53	200	0.61	0.013	25.62	0.82	45.0		0.27	302.19	301.91	2.1
A18	Richmond Street	35	34	35	34	1.99	9.93			45	90	616	3.9	1.99	9.24	12.35	200	0.40	0.013	20.74	0.66	90.0	0.01	0.36	301.90	301.54	59.5
	Richmond Street	34	272	34		0.00	9.93				0	616	3.9	1.99	9.24	12.35	200	0.40	0.013	20.74	0.66	55.0	0.03	0.22			59.5
	Richmond Street	272	271		271	0.00	9.93				0	616	3.9	1.99	9.24	12.35	200	0.40	0.013	20.74	0.66	55.0	0.03	0.22	301.51	301.29	59.5
A19			270		270	0.54				45	25	25	4.4		0.41	0.45											
	Richmond Street	271	270	271	270	1.01	10.94	2.75	4		11	652	3.9	2.19	9.74	13.12	200	0.54	0.013	24.10	0.77	88.1	0.01	0.48	301.28	300.81	54.4
A20	Richmond Street	270	121	270	121	1.10	12.04	2.75	10		28	679	3.9	2.41	10.12	13.79	200	0.40	0.013	20.74	0.66	88.4		0.35	300.81	300.46	66.5
A21	Elm Street	121	38	121	38	0.23	20.79	2.75	1		3	928	3.8	4.16	13.54	19.47	200	0.38	0.013	20.11	0.64	109.4	0.03	0.41	299.85	299.44	96.8
A22	Fairview Place	140	39	140	39	0.75	0.75	2.75	6		17	17	4.4	0.15	0.28	0.47	200	0.47	0.013	22.49	0.72	63.7		0.30	300.38	300.08	2.1
A23	Saintsbury Line	276	178	276	178	0.41	0.41	2.75	2		6	6	4.4	0.08	0.09	0.19	200	0.73	0.013	27.97	0.89	55.0		0.40	301.08	300.68	0.7
A24	Langford Drive	178	146	178	146	0.58	0.99	2.75	3		8	14	4.4	0.20	0.23	0.47	200	0.43	0.013	21.46	0.68	67.7	0.08	0.29	300.60	300.31	2.2
A25	Langford Drive	146	39	146	39	1.11	2.10	2.75	5		14	28	4.4	0.42	0.46	0.97	200	0.37	0.013	19.95	0.64	87.5		0.32	300.28	299.96	4.8
A26	Langford Drive	39	147	39	147	0.56	3.41	2.75	5		14	41	4.3	0.68	0.68	1.50	200	0.35	0.013	19.40	0.62	63.7	0.03	0.22	299.93	299.71	7.7
A27	Langford Drive	147	38	147	38	0.53	3.94	2.75	4		11	52	4.3	0.79	0.86	1.81	200	0.39	0.013	20.48	0.65	64.6	0.03	0.25	299.68	299.43	8.9
A28	Langford Drive	141	38	141	38	0.86	0.86	2.75	5		14	14	4.4	0.17	0.23	0.44	200	0.55	0.013	24.32	0.77	63.4		0.35	300.21	299.86	1.8
	Elm Street	38	122	38	122	0.00	25.59				0	994	3.8	5.12	14.43	21.50	200	0.52	0.013	23.65	0.75	32.6	0.02	0.17	299.42	299.25	90.9
A29	Watson Street	245	246	245	246	1.04	1.04	2.75	11		30	30	4.4	0.21	0.50	0.78	200	0.70	0.013	27.44	0.87	80.4		0.56	301.90	301.34	2.9
A30	Watson Street	246	247	246	247	0.17	1.21	2.75	2		6	36	4.3	0.24	0.59	0.92	200	0.40	0.013	20.74	0.66	41.0	0.01	0.16	301.33	301.16	4.4
A31	Radcliffe Crescent	247	248	247	248	0.51	1.72	2.75	8		22	58	4.3	0.34	0.95	1.42	200	0.40	0.013	20.74	0.66	64.9	0.02	0.26	301.14	300.88	6.9
A32	Radcliffe Crescent	248	249	248	249	0.25	1.97	2.75	2		6	63	4.3	0.39	1.04	1.57	200	0.40	0.013	20.74	0.66	20.0	0.01	0.08	300.87	300.79	7.6
A33	Radcliffe Crescent	249	250	249	250	0.11	2.08	2.75	1		3	66	4.3	0.42	1.08	1.65	200	0.40	0.013	20.74	0.66	23.0	0.01	0.09	300.78	300.69	7.9
A34	Radcliffe Crescent	247	253	247	253	0.37	0.37	2.75	8		22	22	4.4	0.07	0.37	0.49	200	0.70	0.013	27.44	0.87	71.0		0.50	301.66	301.16	1.8
A35	Radcliffe Crescent	182	253	182	253	1.02	1.02	2.75	11		30	30	4.4	0.20	0.50	0.78	200	0.70	0.013	27.44	0.87	125.0		0.88	302.04	301.16	2.8
A36	Radcliffe Crescent	253	252	253	252	0.52	1.91	2.75	8		22	74	4.3	0.38	1.21	1.75	200	0.43	0.013	21.53	0.69	64.9	0.00	0.28	301.16	300.88	8.1
A37	Radcliffe Crescent	252	251	252	251	0.15	2.06	2.75	1		3	77	4.3	0.41	1.26	1.84	200	0.40	0.013	20.74	0.66	20.0	0.01	0.08	300.87	300.79	8.8
A38	Radcliffe Crescent	251	250	251	250	0.19	2.25	2.75	2		6	83	4.3	0.45	1.34	1.97	200	0.45	0.013	22.10	0.70	19.0	0.01	0.09	300.78	300.70	8.9
	Easement	250	43	250	43	0.00	4.33				0	149	4.2	0.87	2.38	3.57	200	0.40	0.013	20.74	0.66	122	0.02	0.49	300.68	300.19	17.2
	Easement	43	44	43	44	0.00	4.33				0	149	4.2	0.87	2.38	3.57	200	0.50	0.013	23.19	0.74	8.2	0.00	0.04	300.19	300.15	15.4
A39	Saintsbury Line	180	181	180	181	1.45	1.45	2.75	6		17	17	4.4	0.29	0.28	0.62	200	0.50	0.013	23.19	0.74	120.0		0.60	302.18	301.58	2.7
A40		181	273	181	163	1.03	2.48	2.75	4		11	28	4.4	0.50	0.46	1.05	200	0.70	0.013	27.44	0.87	120.0	0.01	0.84	301.57	300.73	3.8
A41	Nicoline Avenue	273	274	163	164	1.44	3.92	2.75	3		8	36	4.3	0.78	0.59	1.51	200	0.40	0.013	20.61	0.66	98.5	0.04	0.39	300.69	300.30	7.3
A42	Nicoline Avenue	274	44	164	44	1.67	5.59	2.75	4		11	47	4.3	1.12	0.77	2.08	200	0.39	0.013	20.59	0.66	90.0	0.01	0.35	300.29	299.93	10.1
A43	Nicoline Avenue	44	41	44	41	1.03	10.95	2.75	5		14	209	4.1	2.19	3.31	6.05	200	0.42	0.013	21.26	0.68	67.5	0.01	0.28	299.92	299.64	28.4
A44	John Street	235	52	235	52	0.49	0.49	2.75	5		14	14	4.4	0.10	0.23	0.36	200	0.72	0.013	27.81	0.89	88.5		0.64	300.80	300.16	1.3
	John Street	52	47	52	47	0.00	0.49				0	14	4.4	0.10	0.23	0.36	200	0.50	0.013	23.19	0.74	8.2	0.00	0.04	300.12	300.08	1.6
A45	Nicoline Avenue	48	47	48	47	0.68	0.68	2.75	9		25	25	4.4	0.14	0.41	0.60	200	0.34	0.013	19.12	0.61	75.3		0.26	300.41	300.15	3.2
A46	Nicoline Avenue	47	46	47	46	0.25	1.42	2.75	3		8	47	4.3	0.28	0.77	1.16	200	0.34	0.013	19.12	0.61	45.7	0.01	0.16	300.15	299.99	6.1
A47	Nicoline Avenue	46	45	46	45	0.24	1.66	2.75	3		8	55	4.3	0.33	0.90	1.36	200	0.34	0.013	19.12	0.61	41.1	0.00	0.14	299.99	299.85	7.1
A48	Nicoline Avenue	45	41	45	41	1.26	2.92	2.75	3		8	63	4.3	0.58	1.04	1.78	200	0.34	0.013	19.12	0.61	50.9	0.00	0.17	299.85	299.68	9.3

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.1 people/unit
High Density (Apartments)	150 units per hectare @	1.7 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare		
School	140 L per student per day	Manning's n	0.013	Project:	20158
Commercial	45 people per hectare			Date:	June 2021
Uncertain Development Factor	1.1				

Location						Area		Population					Peaking Factor	Peak Cumulative Sewage Flow			Sewer Design					Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population		Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A49	Elm Street	41	179	41	179	0.30	14.17	2.75	2		6	278	4.1	2.83	4.34	7.89	200	0.34	0.013	19.12	0.61	88.1	0.02	0.30	299.66	299.36	41.3
A50	Harold Court	274	61	274	61	0.92	0.92	2.75	13		36	36	4.3	0.18	0.59	0.85	200	1.00	0.013	32.80	1.04	96.0		0.96	300.57	299.61	2.6
A51	Harold Court	61	179	61	179	0.40	1.32	2.75	5		14	50	4.3	0.26	0.82	1.19	200	0.34	0.013	19.12	0.61	65.5	0.00	0.22	299.61	299.39	6.2
A52	Elm Street	179	42	179	42	0.33	15.82	2.75	1		3	330	4.1	3.16	5.12	9.11	200	0.34	0.013	19.12	0.61	31.1	0.03	0.11	299.36	299.25	47.6
	Elm Street	42	40	42	40	0.00	15.82				0	330	4.1	3.16	5.12	9.11	200	0.34	0.013	19.12	0.61	25.9	0.00	0.09	299.25	299.16	47.6
A53	Elm Street	40	122	40	122	0.33	16.15	2.75	2		6	336	4.1	3.23	5.20	9.27	200	0.34	0.013	19.12	0.61	86.9	0.00	0.30	299.16	298.87	48.5
A54	Easement	122	148	122	148	1.41	43.15				0	1329	3.7	8.63	18.87	30.25	300	0.53	0.013	70.40	1.00	112.8	0.43	0.60	298.82	298.23	43.0
	Easement	148	64	148	64	0.00	43.15				0	1329	3.7	8.63	18.87	30.25	300	0.24	0.013	47.37	0.67	20.4	0.03	0.05	298.20	298.15	63.9
A55	Albert Street	123	291	123	275	0.73	0.73	2.75	9		25	25	4.4	0.15	0.41	0.61	200	1.14	0.013	35.02	1.11	63.1		0.72	300.90	300.19	1.8
A56	Albert Street	291	64	275	64	0.71	1.44	2.75	7		19	44	4.3	0.29	0.73	1.12	200	1.12	0.013	34.71	1.10	71.9	0.02	0.81	300.17	299.36	3.2
	Easement	64	62	64	62	0.00	44.59				0	1373	3.7	8.92	19.44	31.20	300	0.20	0.013	43.25	0.61	11.0	1.25	0.02	298.11	298.09	72.1
A57	Watson Street	244	243	244	243	0.27	0.27	2.75	3		8	8	4.4	0.05	0.14	0.21	200	0.70	0.013	27.44	0.87	35.0	0.03	0.25	300.60	300.36	0.8
A58	Watson Street	243	242	243	242	0.85	1.12	2.75	11		30	39	4.3	0.22	0.64	0.95	200	0.70	0.013	27.44	0.87	96.0	0.03	0.67	300.33	299.66	3.5
A59	Watson Street	242	240	242	240	0.98	2.10	2.75	13		36	74	4.3	0.42	1.21	1.80	200	0.40	0.013	20.74	0.66	96.0	0.03	0.38	299.64	299.25	8.7
A60	Watson Street	240	241	240	241	0.39	2.49	2.75	3		8	83	4.3	0.50	1.34	2.03	200	0.40	0.013	20.74	0.66	16.3	0.03	0.07	299.23	299.16	9.8
A61	Watson Street	241	234	241	234	0.54	3.03	2.75	6		17	99	4.2	0.61	1.61	2.43	200	0.40	0.013	20.74	0.66	92.9	0.03	0.37	299.14	298.77	11.7
A62	John Street	243	235	243	235	0.53	0.53	2.75	6		17	17	4.4	0.11	0.28	0.42	200	0.70	0.013	27.44	0.87	93.8	0.03	0.66	300.52	299.86	1.5
A63	Joseph Street	235	236	235	236	0.93	1.46	2.75	12		33	50	4.3	0.29	0.82	1.22	200	0.60	0.013	25.41	0.81	99.0	0.03	0.59	299.84	299.25	4.8
A64	Joseph Street	236	237	236	237	0.69	2.15	2.75	9		25	74	4.3	0.43	1.21	1.81	200	0.40	0.013	20.74	0.66	81.8	0.03	0.33	299.22	298.89	8.7
A65	Joseph Street	237	234	237	234	0.26	2.41	2.75	3		8	83	4.3	0.48	1.34	2.01	200	0.40	0.013	20.74	0.66	25.8	0.03	0.10	298.87	298.77	9.7
A66	Joseph Street	238	239	238	239	0.18	0.18	2.75	2		6	6	4.4	0.04	0.09	0.14	200	0.70	0.013	27.44	0.87	17.0	0.03	0.12	299.08	298.96	0.5
A67	Joseph Street	239	234	239	234	0.11	0.29	2.75	1		3	8	4.4	0.06	0.14	0.22	200	0.70	0.013	27.44	0.87	24.5	0.03	0.17	298.94	298.77	0.8
	Watson Street	234	NPS	234	PS	0.00	5.73				0	190	4.2	1.15	3.01	4.57	200	0.40	0.013	20.74	0.66	10.0	0.03	0.04	298.74	298.70	22.1
	Easement	NPS	232	PS	232	0.00	5.73				0	847	3.8	1.15	12.44	14.94	200	0.40	0.013	20.74	0.66	43.7		0.17	300.33	300.15	72.0
	Easement	232	50	232	50	0.00	5.73				0	847	3.8	1.15	12.44	14.94	250	0.30	0.013	32.57	0.66	45.7		0.14	300.09	299.95	45.9
A68	Nicoline Avenue	51	50	51	50	0.39	0.39	2.75	4		11	11	4.4	0.08	0.19	0.29	200	0.34	0.013	19.12	0.61	39.6		0.13	300.12	299.98	1.5
A69	Nicoline Avenue	48	49	48	49	0.72	0.72	2.75	10		28	28	4.4	0.14	0.46	0.66	200	0.34	0.013	19.12	0.61	76.2		0.26	300.43	300.17	3.5
A70	Nicoline Avenue	49	50	49	50	0.44	1.16	2.75	5		14	41	4.3	0.23	0.68	1.01	200	0.34	0.013	19.12	0.61	54.9	0.00	0.19	300.17	299.98	5.3
A71	Kleinfeldt Avenue	50	56	50	56	0.37	7.65	2.75	4		11	910	3.8	1.53	13.30	16.31	250	0.28	0.013	31.47	0.64	71.0	0.03	0.20	299.95	299.75	51.8
A72	Kleinfeldt Avenue	56	55	56	55	0.71	8.36	2.75	10		28	938	3.8	1.67	13.67	16.88	250	0.28	0.013	31.47	0.64	81.4	0.00	0.23	299.75	299.53	53.6
A73	Kleinfeldt Avenue	55	54	55	54	0.25	8.61	2.75	3		8	946	3.8	1.72	13.79	17.06	250	0.25	0.013	29.73	0.61	47.2	0.25	0.12	299.28	299.16	57.4
A74	Kleinfeldt Avenue	53	54	53	54	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	0.30	0.013	17.96	0.57	29.6		0.09	299.25	299.16	1.2
A75	Marlene Street	54	57	54	57	0.62	9.52	2.75	8		22	976	3.8	1.90	14.19	17.71	250	0.25	0.013	29.73	0.61	76.2	0.02	0.19	299.14	298.95	59.6
A76	Marlene Street	57	58	57	58	0.51	10.03	2.75	6		17	993	3.8	2.01	14.42	18.06	250	0.25	0.013	29.73	0.61	77.1	0.02	0.19	298.94	298.74	60.8
A77	Harold Court	59	60	59	60	1.19	1.19	2.75	13		36	36	4.3	0.24	0.59	0.91	200	1.00	0.013	32.80	1.04	56.7		0.57	301.66	301.09	2.8
A78	Albert Street	60	65	60	65	0.24	1.43	2.75	2		6	41	4.3	0.29	0.68	1.07	200	2.00	0.013	46.38	1.48	61.0	0.07	1.22	301.03	299.81	2.3
A79	Albert Street	65	58	65	58	0.46	1.89	2.75	6		17	58	4.3	0.38	0.95	1.46	200	2.00	0.013	46.38	1.48	52.4	0.02	1.05	299.79	298.74	3.1
A80	Albert Street	58	294	58	199	0.08	12.00				0	1051	3.8	2.40	15.19	19.35	200	0.75	0.013	28.40	0.90	40.2	0.02	0.30	298.73	298.43	68.1
A81	Albert Street	294	63	199	63	0.32	12.32	2.75	2		6	1056	3.8	2.46	15.26	19.50	200	0.20	0.013	14.67	0.47	48.8	0.01	0.10	298.42	298.32	133.0
		63	62	63	62	0.00	12.32				0	1056	3.8	2.46	15.26	19.50	200	0.20	0.013	14.67	0.47	12.2	0.00	0.02	298.32	298.29	133.0
	Easement	62	198	62	198	0.00	56.91				0	2429	3.5	11.38	32.65	48.43	300	0.20	0.013	43.25	0.61	60.0	0.00	0.12	298.09	297.97	112.0
	Easement	198	197	198	197	0.00	56.91				0	2429	3.5	11.38	32.65	48.43	300	0.25	0.013	48.35	0.68	71.3	0.34	0.18	297.95	297.77	100.2
	Easement	197	33	197	33	0.00	56.91				0	2429	3.5	11.38	32.65	48.43	300	0.19	0.013	42.15	0.60	111.9	0.02	0.21	297.76	297.54	114.9

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.1 people/unit
High Density (Apartments)	150 units per hectare @	1.7 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design					Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A82	Princess Street	138	67	138	67	1.05	1.05	2.75	9		25	25	4.4	0.21	0.41	0.69	200	1.30	0.013	37.40	1.19	91.7		1.19	301.81	300.61	1.8
A83	Princess Street	67	66	67	66	1.19	2.24	2.75	9		25	50	4.3	0.45	0.82	1.39	200	1.28	0.013	37.05	1.18	91.7	0.48	1.17	300.14	298.96	3.8
A84	Princess Street	66	33	66	33	0.37	2.61	2.75	2		6	55	4.3	0.52	0.90	1.57	200	0.77	0.013	28.69	0.91	75.3	0.04	0.58	298.93	298.35	5.5
	Easement	33	142	33	142	0.00	59.52				0	2484	3.5	11.90	33.31	49.74	300	0.33	0.013	55.55	0.79	102.7	0.83	0.34	297.52	297.18	89.5
A85	Water Street	70	125	70	125	0.56	0.56	2.75	5		14	14	4.4	0.11	0.23	0.38	200	0.53	0.013	23.88	0.76	71.9		0.38	298.31	297.93	1.6
A86	William Street	125	142	125	142	0.47	1.03	2.75	5		14	28	4.4	0.21	0.46	0.73	200	0.47	0.013	22.49	0.72	61.3	0.03	0.29	297.90	297.61	3.2
A87	William Street	142	128	142	128	0.37	60.92	2.75	2		6	2517	3.5	12.18	33.71	50.48	300	0.33	0.013	55.55	0.79	38.4	0.45	0.13	297.16	297.03	90.9
A88	William Street	126	127	126	127	1.03	1.03			45	47	47	4.3	0.21	0.77	1.08	200	1.02	0.013	33.12	1.05	63.4		0.65	300.22	299.58	3.2
A89	William Street	127	128	127	128	0.69	1.72	2.75	8		22	69	4.3	0.34	1.13	1.62	200	2.21	0.013	48.76	1.55	74.7	0.03	1.65	299.55	297.90	3.3
A90	Frank Street	128	68	128	68	0.59	63.23	2.75	7		19	2605	3.5	12.65	34.76	52.15	375	0.36	0.013	105.20	0.95	73.8	0.91	0.27	296.98	296.72	49.6
A91	Frank Street		69		69	0.68				45	31	31	4.4		0.51	0.57	375										
A91	Frank Street	68	69	68	69	1.26	64.49	2.75	7		19	2655	3.5	12.90	35.36	53.09	375	0.25	0.013	87.67	0.79	88.4	0.03	0.22	296.69	296.47	60.6
A92	Frank Street	69	23	69	23	0.45	64.94	2.75	7		19	2675	3.5	12.99	35.59	53.44	300	0.25	0.013	48.35	0.68	89.9	0.03	0.22	296.44	296.21	110.5
A93	Spencer Avenue	AP	AO	220	226	0.28	0.28	2.75	6		17	17	4.4	0.06	0.28	0.37	200	0.33	0.013	18.84	0.60	64.1		0.21	302.61	302.40	1.9
A94	Spencer Avenue	AO	AN	226	227	0.80	1.08	2.75	2		6	22	4.4	0.22	0.37	0.64	200	0.33	0.013	18.84	0.60	29.0	0.03	0.10	302.37	302.27	3.4
A95	Spencer Avenue	AN	AM	227	224	0.49	1.57	2.75	5		14	36	4.3	0.31	0.59	1.00	200	0.33	0.013	18.84	0.60	34.9	0.03	0.12	302.24	302.13	5.3
A96	Spencer Avenue	AM	AL	224	223	0.40	1.97	2.75	5		14	50	4.3	0.39	0.82	1.33	200	0.33	0.013	18.84	0.60	49.7	0.03	0.16	302.10	301.94	7.1
A97	Spencer Avenue	AL	AK	223	225	0.79	5.66	2.75	10		28	286	4.1	1.13	4.46	6.16	200	0.33	0.013	18.84	0.60	93.2	0.03	0.31	301.91	301.60	32.7
DDd	**Street B**	**S7**	**S6**			**0.21**	**0.21**	**2.10**	**16**		**34**	**34**	**4.3**	**0.04**	**0.56**	**0.66**	**200**	**0.5**	**0.013**	**23.19**	**0.74**	**68.4**					
	Street B	**S6**	**S4**			**0.00**	**0.21**	**2.75**	**0**		**0**	**34**	**4.3**	**0.04**	**0.56**	**0.66**	**200**	**0.33**	**0.013**	**18.84**	**0.60**	**22.1**					
	Abbey Lane		**S5**			**5.40**	**5.40**	**2.75**	**162**		**446**	**446**															
	Abbey Lane	**S5**	**S4**			**0.10**	**5.50**	**2.75**	**3**		**8**	**454**	**4.0**	**1.10**	**6.92**	**8.83**	**200**	**0.65**	**0.013**	**26.44**	**0.84**	**46.8**					
	Abbey Lane	**S4**	**S3**			**0.13**	**5.85**	**2.75**	**4**		**11**	**498**	**4.0**	**1.17**	**7.57**	**9.61**	**200**	**0.33**	**0.013**	**18.84**	**0.60**	**62.2**					
	Abbey Lane	**S3**	**S2**			**0.27**	**6.11**	**2.75**	**8**		**22**	**520**	**4.0**	**1.22**	**7.88**	**10.01**	**200**	**0.33**	**0.013**	**18.84**	**0.60**	**65.0**					
	Abbey Lane	**S2**	**S1**			**0.27**	**6.38**	**2.75**	**8**		**22**	**542**	**4.0**	**1.28**	**8.19**	**10.42**	**200**	**0.4**	**0.013**	**20.74**	**0.66**	**70.0**					
	Abbey Lane	**S1**	**AK**			**0.13**	**6.51**	**2.75**	**4**		**11**	**553**	**4.0**	**1.30**	**8.35**	**10.62**	**200**	**0.33**	**0.013**	**18.84**	**0.60**	**82.2**					
A98	Spencer Avenue	AK	AJ	225	213	0.56	12.73	2.75	5		14	853	3.8	2.55	12.52	16.58	200	0.33	0.013	18.84	0.60	70.8	0.03	0.23	301.57	301.33	88.0
A99	Spencer Avenue	AJ	AI	213	218	0.05	12.78	2.75	5		14	867	3.8	2.56	12.71	16.79	200	0.33	0.013	18.84	0.60	20.2	0.03	0.07	301.30	301.24	89.1
A100	Spencer Avenue	AI	230	218	230	0.13	12.91	2.75	5		14	881	3.8	2.58	12.90	17.03	200	0.33	0.013	18.84	0.60	73.1	0.03	0.24	301.21	300.97	90.4
A101	Saintsbury Line	230	231	230	231	0.56	13.47				0	881	3.8	2.69	12.90	17.15	200	0.23	0.013	15.79	0.50	98.6	0.05	0.23	300.92	300.69	108.6
	Saintsbury Line	231	86	231	86	0.00	13.47				0	881	3.8	2.69	12.90	17.15	200	0.25	0.013	16.40	0.52	11.0	0.03	0.03	300.66	300.63	104.6
	Saintsbury Line	86	84	86	84																				300.60	300.44	
A102	Saintsbury Line	86	87	86	87	1.26	14.73	2.75	3		8	889	3.8	2.95	13.01	17.55	200	0.56	0.013	24.54	0.78	76.3	0.03	0.43	300.60	300.17	71.5
A103	Saintsbury Line	174	87	174	87	0.72	0.72	2.75	2		6	6	4.4	0.14	0.09	0.26	200	0.68	0.013	27.05	0.86	45.5		0.31	300.46	300.15	1.0
	Market Street	87	83	87	83	0.00	15.45				0	894	3.8	3.09	13.09	17.79	200	0.25	0.013	16.40	0.52	19.3	0.05	0.05	300.10	300.05	108.5
A104	Alice Street	175	84	175	84	0.86	0.86	2.75	9		25	25	4.4	0.17	0.41	0.64	200	0.52	0.013	23.65	0.75	82.3		0.43	300.87	300.44	2.7
A105	Saintsbury Line	84	83	84	83	0.11	0.97	2.75	1		3	28	4.4	0.19	0.46	0.72	200	0.33	0.013	18.84	0.60	87.5	0.08	0.29	300.36	300.10	3.8
A106	Market Street	83	153	83	153	0.72	17.14	2.75	5		14	936	3.8	3.43	13.65	18.78	200	0.41	0.013	21.08	0.67	77.5	0.05	0.32	300.05	299.73	89.1
A107	Market Street	153	22	153	22	0.96	18.10	2.75	7		19	955	3.8	3.62	13.91	19.28	200	0.36	0.013	19.81	0.63	82.2	0.03	0.30	299.70	299.40	97.3
A108	Market Street	22	152	22	152	1.16	19.26	2.75	7		19	974	3.8	3.85	14.17	19.82	200	0.41	0.013	21.07	0.67	94.5	0.03	0.39	299.37	298.98	94.1
A109	Market Street	152	4	152	4	1.31	20.57				0	974	3.8	4.11	14.17	20.11	200	0.95	0.013	31.97	1.02	90.5	0.02	0.86	298.9599957	298.10	62.9
A110	Duchess Avenue	18	156	18	156	1.87	1.87	2.75	13		36	36	4.3	0.37	0.59	1.06	200	1.00	0.013	32.86	1.05	122.5		1.23	300.85	299.62	3.2
A111	Duchess Avenue	156	19	156	19	0.42	2.29	2.75	2		6	41	4.3	0.46	0.68	1.25	200	0.40	0.013	20.74	0.66	37.2	0.05	0.15	299.57	299.42	6.0
A112	Duchess Avenue	19	20	19	20	0.47	2.76	2.75	2		6	47	4.3	0.55	0.77	1.46	200	0.53	0.013	23.88	0.76	52.7	0.02	0.28	299.39	299.11	6.1
A113	Lewis Avenue	21	20	21	20	0.95	0.95	2.75	8		22	22	4.4	0.19	0.37	0.61	200	0.62	0.013	25.83	0.82	84.7		0.53	299.63	299.10	2.4
A114	Duchess Avenue	20	5	20	5	0.67	4.38	2.75	2		6	74	4.3	0.88	1.21	2.30	200	0.45	0.013	22.00	0.70	106.1	0.02	0.48	299.09	298.61	10.4

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.1 people/unit
High Density (Apartments)	150 units per hectare @	1.7 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population					Peaking Factor	Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population		Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A115	Beech Street	275	5	165	5	0.72	0.72	2.75	6		17	17	4.4	0.14	0.28	0.46	200	0.60	0.013	25.41	0.81	73.2		0.44	299.44	299.00	1.8
A116			189		189	0.56		1.70	150		255	255															
	Beech Street	5	189	5	189	0.99	6.09	2.75	2		6	351	4.0	1.22	5.43	7.31	200	0.34	0.013	19.18	0.61	63.4	0.41	0.22	298.59	298.37	38.1
A117	Beech Street	189	4	189	4	0.29	6.38	2.75	2		6	357	4.0	1.28	5.51	7.47	200	0.39	0.013	20.40	0.65	62.5	0.02	0.24	298.35	298.11	36.6
A118	Market Street	4	151	4	151	0.77	27.72	2.75	5		14	1345	3.7	5.54	19.07	27.08	200	0.41	0.013	20.99	0.67	63.5	0.03	0.26	298.07	297.81	129.0
A119		151	150	151	150	0.31	28.03	2.75	3		8	1353	3.7	5.61	19.18	27.26	200	0.43	0.013	21.54	0.69	64.9	0.02	0.28	297.7899979	297.51	126.5
A120	Alice Street	154	155	154	155	1.06	1.06	2.75	9		25	25	4.4	0.21	0.41	0.69	200	0.34	0.013	19.12	0.61	82.6		0.28	301.47	301.19	3.6
A121	Alice Street	155	295	155	183	0.35	1.41	2.75	3		8	33	4.3	0.28	0.55	0.91	200	0.39	0.013	20.48	0.65	41.1	0.03	0.16	301.16	301.00	4.5
A122	Alice Street	295	124	183	124	1.12	2.53	2.75	10		28	61	4.3	0.51	0.99	1.65	200	0.30	0.013	17.96	0.57	109.7	0.03	0.33	300.97	300.64	9.2
A123	Alice Street	124	185	124	185	0.68	3.21			45	31	91	4.3	0.64	1.49	2.34	200	0.38	0.013	20.19	0.64	37.8	0.00	0.14	300.64	300.50	11.6
	Easement	185	186	185	186	0.00	3.21				0	91	4.3	0.64	1.49	2.34	200	0.54	0.013	24.10	0.77	66.1		0.36	300.50	300.14	9.7
A124	Easement	186	184	186	184	0.68	3.89			45	31	122	4.2	0.78	1.97	3.02	200	1.38	0.013	38.53	1.23	73.2	0.03	1.01	300.11	299.10	7.8
A125	Easement	184	187	184	187	0.64	4.53			45	29	151	4.2	0.91	2.42	3.66	200	1.21	0.013	36.08	1.15	55.2	0.03	0.67	299.07	298.40	10.1
A126	Easement	187	150	187	150	0.56	5.09			45	25	177	4.2	1.02	2.81	4.22	200	1.29	0.013	37.18	1.18	44.8	0.02	0.58	298.38	297.80	11.3
A127	Market Street	150	23	150	23	0.06	33.18				0	1530	3.7	6.64	21.46	30.91	200	0.42	0.013	21.26	0.68	40.5	0.03	0.17	297.78	297.61	145.4
A128	Oak Street	23	24	23	24	0.09	98.21	2.75	2		6	4210	3.3	19.64	53.28	80.21	375	0.49	0.013	122.73	1.11	28.6	1.40	0.14	296.21	296.07	65.4
A129	Duchess Avenue	31	149	31	149	1.22	1.22	2.75	11		30	30	4.4	0.24	0.50	0.82	200	0.41	0.013	21.00	0.67	94.4		0.39	299.75	299.36	3.9
A130	Oak Street	149	25	149	25	0.41	1.63	2.75	3		8	39	4.3	0.33	0.64	1.06	200	2.57	0.013	52.58	1.67	63.1	0.06	1.62	299.31	297.68	2.0
A131	Butler Street	144	145	144	145	0.75	0.75	2.75	4		11	11	4.4	0.15	0.19	0.37	200	0.41	0.013	21.00	0.67	69.5		0.28	297.31	297.02	1.8
A132		145	25	145	25	0.22	0.97	2.75	1		3	14	4.4	0.19	0.23	0.47	200	0.43	0.013	21.43	0.68	72.2	0.02	0.31	297.00	296.69	2.2
A133	Oak Street	25	24	25	24	0.15	2.75	2.75	2		6	58	4.3	0.55	0.95	1.65	200	0.71	0.013	27.64	0.88	35.4	0.07	0.25	296.62	296.37	6.0
A134	Easement	24	188	24	188	0.33	101.29	2.75	3		8	4276	3.3	20.26	54.01	81.70	375	0.38	0.013	108.36	0.98	47.9	0.33	0.18	296.04	295.86	75.4
A135	Easement	188	191	188	191	1.40	102.69	2.75	10		28	4303	3.3	20.54	54.32	82.34	375	0.20	0.013	78.21	0.71	94.8	0.03	0.19	295.83	295.64	105.3
A136	Easement	191	30	191	30	0.39	103.08	2.75	4		11	4314	3.3	20.62	54.44	82.56	375	0.22	0.013	82.42	0.75	96.9	0.03	0.21	295.61	295.39	100.2
A137	Water Street	71	72	71	72	0.29	0.29	2.75	2		6	6	4.4	0.06	0.09	0.17	200	0.50	0.013	23.19	0.74	24.3		0.12	297.67	297.55	0.7
A138	Water Street	72	73	72	73	0.60	0.89	2.75	7		19	25	4.4	0.18	0.41	0.65	200	0.48	0.013	22.72	0.72	62.5	0.03	0.30	297.52	297.22	2.9
A139	Water Street	73	74	73	74	0.32	1.21	2.75	4		11	36	4.3	0.24	0.59	0.92	200	0.41	0.013	21.00	0.67	56.1	0.05	0.23	297.17	296.94	4.4
A140	Easement	196	74	196	74	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	1.16	0.013	35.33	1.12	46.6		0.54	297.48	296.94	0.6
A141	Water Street	74	158	74	158	0.36	1.86	2.75	4		11	55	4.3	0.37	0.90	1.40	200	0.47	0.013	22.41	0.71	56.7	0.03	0.26	296.91	296.65	6.3
A142	Main Street	158	282	158	171	0.74	2.60	2.75	5		14	69	4.3	0.52	1.13	1.81	200	0.59	0.013	25.13	0.80	109.1	0.03	0.64	296.62	295.97	7.2
A143	Elizabeth Street	79	78	79	78	0.74	0.74	2.75	2		6	6	4.4	0.15	0.09	0.27	200	0.50	0.013	23.19	0.74	15.0		0.08	297.92	297.85	1.1
A144	Elizabeth Street	78	77	78	77	0.84	1.58	2.75	9		25	30	4.4	0.32	0.50	0.90	200	0.38	0.013	20.22	0.64	98.5	0.03	0.37	297.82	297.44	4.5
A145	Margaret Street	81	76	81	76	0.73	0.73	2.75	8		22	22	4.4	0.15	0.37	0.56	200	0.57	0.013	24.85	0.79	82.9		0.48	298.39	297.91	2.3
		272	75	272	75	0.00	0										200	1.40	0.013	38.81	1.24	44.1		0.62	298.87	298.25	0.0
A146	George Street	75	76	75	76	0.62	0.62	2.75	4		11	11	4.4	0.12	0.19	0.34	200	0.26	0.013	16.69	0.53	42.5	0.05	0.11	298.20	298.09	2.0
A147	George Street	76	77	76	77	0.52	1.87	2.75	6		17	50	4.3	0.37	0.82	1.31	200	0.43	0.013	21.41	0.68	107.9	0.28	0.46	297.81	297.35	6.1
A148	George Street	77	129	77	129	0.56	4.01	2.75	6		17	96	4.2	0.80	1.56	2.60	200	0.35	0.013	19.32	0.61	85.1	0.03	0.30	297.41	297.12	13.5
	George Street	129	296	129		0.00	4.01	2.75	0		0	96	4.2	0.80	1.56	2.60	200	0.49	0.013	23.01	0.73	85.5	0.03	0.42	-0.03	-0.45	11.3
A149	George Street	296	282		171	1.26	5.27	2.75	4		11	107	4.2	1.05	1.73	3.07	200	0.49	0.013	23.01	0.73	85.5	0.03	0.42	297.08	296.66	13.3
A150	Main Street	37	280	37	169	12.47	12.47			45	165	165	4.2	2.49	2.63	5.64	200	0.51	0.013	23.42	0.75	108.5		0.55	298.86	298.30	24.1
A151	Main Street	280	288	169		1.02	13.49	2.75	4		11	176	4.2	2.70	2.80	6.05	200	0.44	0.013	21.73	0.69	108.8	0.01	0.48	298.29	297.82	27.8
		288	281		170	0.00	13.49	2.75	0		0	176	4.2	2.70	2.80	6.05	200	0.44	0.013	21.73	0.69	108.8	0.01	0.48	297.81	297.33	27.8
A152	Main Street	281	36	170	36	2.10	15.59	2.75	8		22	198	4.1	3.12	3.14	6.88	200	0.43	0.013	21.51	0.68	107.3	0.00	0.46	297.82	297.35	32.0
A153	Main Street	36	282	36	171	1.59	17.18	2.75	4		11	209	4.1	3.44	3.31	7.42	200	0.41	0.013	21.00	0.67	108.2	0.00	0.44	297.35	296.91	35.3

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.1 people/unit
High Density (Apartments)	150 units per hectare @	1.7 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population					Peaking Factor	Peak Cumulative Sewage Flow			Sewer Design					Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population		Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A154	Stanley Street	282	30	171	30	0.36	25.41	2.75	2		6	391	4.0	5.08	6.01	12.20	200	0.46	0.013	22.24	0.71	74.1	1.03	0.34	295.88	295.54	54.8
A155	Stanley Street	30	26	30	26	0.23	128.72	2.75	1		3	4708	3.3	25.74	58.78	92.98	375	0.28	0.013	92.78	0.84	57.6	0.18	0.16	295.36	295.20	100.2
DB	**Lucan Woods**		**277**			**0.36**	**0.36**	**1.70**	**54**		**92**	**92**	**4.3**	**0.07**	**1.49**	**1.72**	**200**	**0.31**	**0.013**	**18.14**	0.58	**65.3**					
A156	Butler Street	277	278	166	167	0.52	0.88	2.75	1		3	95	4.3	0.18	1.53	1.88	200	0.38	0.013	20.22	0.64	92.0		0.35	298.304712	297.95	9.3
A157	Butler Street	278	279	167	168	0.83	1.71	2.75	3		8	103	4.2	0.34	1.66	2.21	200	0.47	0.013	22.53	0.72	93.0	0.06	0.44	297.89	297.46	9.8
A158	Butler Street	279	143	168	143	0.72	2.43	2.75	3		8	111	4.2	0.49	1.79	2.51	200	0.37	0.013	19.95	0.64	89.3	0.02	0.33	297.43	297.10	12.6
A159	Easement	195	143	195	143	0.68	0.68	2.75	3		8	8	4.4	0.14	0.14	0.30	200	1.00	0.013	32.80	1.04	48.9		0.49	297.66	297.17	0.9
A160	Butler Street	143	28	143	28	1.17	4.28	2.75	5		14	133	4.2	0.86	2.14	3.29	200	0.47	0.013	22.49	0.72	87.2	0.02	0.41	297.08	296.67	14.6
A161	Butler Street	28	27	28	27	0.72	5	2.75	3		8	141	4.2	1.00	2.27	3.59	200	0.43	0.013	21.51	0.68	84.7	0.03	0.36	296.64	296.28	16.7
A162	Butler Street	27	26	27	26	1.11	6.11	2.75	6		17	158	4.2	1.22	2.52	4.12	200	0.38	0.013	20.22	0.64	92.7	0.02	0.35	296.25	295.90	20.4
A163	Stanley Street	26	DNE	26	190	0.46	135.29	2.75	2		6	4871	3.3	27.06	60.57	96.39	375	0.37	0.013	106.94	0.97	70.4	0.73	0.26	295.17	294.91	90.1
A164	Stanley Street	DNE	130	190	130	0.94	136.23	2.75	3		8	4879	3.3	27.25	60.66	96.69	375	0.40	0.013	110.89	1.00	82.9	0.03	0.33	294.88	294.54	87.2
A165	Kent Avenue	82	3	82	3	0.99	0.99	2.75	6		17	17	4.4	0.20	0.28	0.52	200	0.31	0.013	18.14	0.58	65.3		0.20	297.45	297.25	2.9
A166	Kent Avenue	3	2	3	2	0.86	1.85	2.75	4		11	28	4.4	0.37	0.46	0.91	200	0.29	0.013	17.72	0.56	65.1	0.01	0.19	297.24	297.05	5.1
A167	Kent Avenue	2	1	2	1	2.41	4.26	2.75	5		14	41	4.3	0.85	0.68	1.69	200	0.63	0.013	25.99	0.83	97.1	0.07	0.61	296.98	296.37	6.5
A168	Kent Avenue	1	162	1	162	0.83	5.09	2.75	6		17	58	4.3	1.02	0.95	2.16	200	0.25	0.013	16.53	0.53	90.7	0.03	0.23	296.34	296.11	13.1
A169	Kent Avenue	162	161	162	161	0.67	5.76	2.75	5		14	72	4.3	1.15	1.17	2.55	250	0.25	0.013	29.73	0.61	87.6	0.63	0.22	295.48	295.26	8.6
A170	Kent Avenue	161	160	161	160	1.00	6.76	2.75	9		25	96	4.2	1.35	1.56	3.21	250	0.25	0.013	29.73	0.61	87.8	0.01	0.22	295.25	295.03	10.8
A171	Kent Avenue	160	130	160	130	0.56	7.32	2.75	2		6	102	4.2	1.46	1.65	3.42	250	0.25	0.013	29.73	0.61	88.2	0.06	0.22	294.97	294.75	11.5
A172	Easement	130	131	130	131	0.85	144.40	2.10	75		158	5138	3.2	28.88	63.47	101.59	375	0.22	0.013	81.30	0.74	68.3	0.24	0.15	294.51	294.36	125.0
A173	Easement	131	132	131	132	1.07	145.47	2.10	75		158	5296	3.2	29.09	65.17	103.69	375	0.35	0.013	103.43	0.94	67.1	0.03	0.23	294.33	294.10	100.3
A174	Beech Street	6	17	6	17	0.32	0.32	2.75	3		8	8	4.4	0.06	0.14	0.22	200	1.50	0.013	40.17	1.28	16.0		0.24	297.11	296.87	0.6
A175	Beech Street	16	17	16	17	1.10	1.10	2.75	6		17	17	4.4	0.22	0.28	0.55	200	1.00	0.013	32.80	1.04	77.0		0.77	297.87	297.10	1.7
A176	Gibson Crescent	17	7	17	7	0.43	1.85	2.75	6		17	41	4.3	0.37	0.68	1.16	200	0.77	0.013	28.78	0.92	64.5	0.29	0.50	296.81	296.31	4.0
A177	Gibson Crescent	7	157	7	157	0.60	2.45	2.75	8		22	63	4.3	0.49	1.04	1.68	200	0.77	0.013	28.78	0.92	64.5	0.01	0.50	296.30	295.80	5.8
A178	Gibson Crescent	157	8	157	8	0.48	2.93	2.75	6		17	80	4.3	0.59	1.30	2.08	200	0.73	0.013	28.02	0.89	52.0	0.05	0.38	295.75	295.37	7.4
A179	Gibson Crescent		9		8	0.39		1.70	150		255	255															
A179	Gibson Crescent	8	9	8	9	0.81	3.74	2.75	6		17	351	4.0	0.75	5.43	6.80	200	1.00	0.013	32.80	1.04	53.2	0.02	0.53	295.35	294.82	20.7
A180	Willow Avenue	15	14	15	14	0.62	0.62	2.75	6		17	17	4.4	0.12	0.28	0.44	200	3.89	0.013	64.69	2.06	60.4		2.35	298.93	296.58	0.7
A181	Willow Avenue	14	10	14	10	0.56	1.18	2.75	6		17	33	4.3	0.24	0.55	0.86	200	0.97	0.013	32.30	1.03	62.8	0.03	0.61	296.55	295.94	2.7
A182	Wilberforce Public School		12		12	4.12	4.12				33	33	4.3	0.82	0.54	1.50											
	Gibson Crescent	13	12	13	12	0.52	4.64	2.75	6		17	49	4.3	0.93	0.81	1.91	200	2.15	0.013	48.05	1.53	60.4		1.30	298.82	297.52	4.0
A183	Gibson Crescent	12	11	12	11	0.71	5.35	2.75	8		22	71	4.3	1.07	1.16	2.45	200	0.63	0.013	25.95	0.83	64.3	0.03	0.40	297.49	297.09	9.5
A184	Gibson Crescent	11	10	11	10	0.59	5.94	2.75	6		17	88	4.3	1.19	1.42	2.87	200	1.12	0.013	34.77	1.11	100.3	0.03	1.13	297.06	295.93	8.3
A185	Gibson Crescent	10	9	10	9	0.33	7.45	2.75	3		8	129	4.2	1.49	2.07	3.92	200	1.56	0.013	40.99	1.30	63.4	0.04	0.99	295.90	294.91	9.6
	Easement	9	32	9	32	0.00	11.19				0	480	4.0	2.24	7.30	10.49	200	0.30	0.013	17.96	0.57	45.4	0.05	0.14	294.85	294.72	58.4
	Easement	32	290	32		0.00	11.19				0	480	4.0	2.24	7.30	10.49	200	0.31	0.013	18.29	0.58	100.3	0.03	0.31	294.69	294.38	57.4
	Easement	290	132		132		11.19				0	480	4.0	2.24	7.30	10.49	200	0.31	0.013	18.29	0.58	100.3	0.03	0.31	294.35	294.03	57.4
	Easement	132	289	132	192	0.00	156.66				0	5776	3.2	31.33	70.29	111.79	375	0.37	0.013	106.94	0.97	88.7	0.31	0.33	294.07	293.74	104.5
	Easement	289	29	192	29	0.00	156.66				0	5776	3.2	31.33	70.29	111.79	375	0.25	0.013	88.02	0.80	75.3	0.18	0.19	293.56	293.37	127.0
A186	Chestnut Street	194	193	194	193	1.18	1.18	2.75	3		8	8	4.4	0.24	0.14	0.41	200	1.42	0.013	39.08	1.24	74.8		1.06	297.03	295.97	1.1
A187	Walnut Street	193	265	193	265	0.11	1.29				0	8	4.4	0.26	0.14	0.44	200	1.27	0.013	36.96	1.18	57.0	0.075	0.72	295.89	295.17	1.2
A188	Walnut Street	260	261	260	261	0.94	0.94	2.75	9		25	25	4.4	0.19	0.41	0.66	200	0.40	0.013	20.74	0.66	74.9		0.30	295.46	295.16	3.2
A189	Walnut Street	261	265	261	265	0.70	1.64	2.75	8		22	47	4.3	0.33	0.77	1.21	200	0.40	0.013	20.74	0.66	74.8	0.03	0.30	295.14	294.84	5.8
A190	Walnut Grove Place	265	264	265	264	0.26	3.19	2.75	3		8	63	4.3	0.64	1.04	1.84	200	0.40	0.013	20.74	0.66	51.6	0.08	0.21	294.76	294.56	8.9
A191	Walnut Grove Place	264	263	264	263	0.33	3.52	2.75	4		11	74	4.3	0.70	1.21	2.11	200	0.40	0.013	20.74	0.66	48.4	0.07	0.19	294.48	294.29	10.2
A192	Walnut Street	260	255	260	255	0.86	0.86	2.75	9		25	25	4.4	0.17	0.41	0.64	200	0.43	0.013	21.51	0.68	75.3		0.32	295.68	295.36	3.0
A193	Walnut Street	254	255	254	255	0.29	1.15	2.75	2		6	30	4.4	0.23	0.50	0.81	200	0.61	0.013	25.62	0.82	23.3		0.14	295.51	295.36	3.1
	Easement	255	258	255	258	0.00	2.01				0	55	4.3	0.40	0.90	1.44	200	0.52	0.013	23.65	0.75	100	0.08	0.52	295.29	294.77	6.1
A194	Walnut Grove Place	256	257	256	257	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	0.61	0.013	25.62	0.82	26.7		0.16	295.01	294.85	0.8
A195	Walnut Grove Place	257	258	257	258	0.31	0.6	2.75	4		11	19	4.4	0.12	0.32	0.49	200	0.52	0.013	23.65	0.75	28.0	0.05	0.15	294.80	294.65	2.1
A196	Walnut Grove Place	258	259	258	259	0.70	3.31	2.75	9		25	99	4.2	0.66	1.61	2.49	200	0.40	0.013	20.74	0.66	66.2	0.03	0.26	294.63	294.36	12.0
A197	Walnut Grove Place	259	262	259	262	0.87	4.18	2.75	12		33	132	4.2	0.84	2.12	3.25	200	0.40	0.013	20.74	0.66	82.5	0.03	0.33	294.34	294.01	15.7
A198	Walnut Grove Place	262	263	262	263	0.80	4.98	2.75	10		28	160	4.2	1.00	2.55	3.90	200	0.40	0.013	20.74	0.66	76.3	0.03	0.31	293.98	293.68	18.8

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
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Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
	Easement	263	266	263	266	0.00	8.50				0	234	4.1	1.70	3.68	5.92	200	0.40	0.013	20.74	0.66	70.7	0.05	0.28	293.63	293.35	28.5
	Easement	266	29	266	29	0.00	8.50				0	234	4.1	1.70	3.68	5.92	200	0.40	0.013	20.74	0.66	16.1	0.08	0.06	293.26	293.20	28.5
	Easement	29	CPS	29	CPS	0.00	165.16					6010	3.2	33.03	72.76	116.38											
A19	Street B					0.75	0.75	2.10	50		105	176															
A20	Street B					1.24	1.99	2.75	43		118	295															
A18	Street B	AH	AG	RC21	RC20	0.59	2.58	2.75	12		33	328	4.1	0.52	5.08	6.16	200	0.60	0.013	25.41	0.81	103.0	0.03	0.62	300.655	299.745	24.2
A23	Street B	AG	AF	RC20	RC19	0.43	3.01	2.10	25		53	380	4.0	0.60	5.86	7.10	200	0.50	0.013	23.19	0.74	20.8	0.03	0.10	299.695	299.383	30.6
A24	Street B	AF	S	RC19	RC3	0.39	3.40	2.75	8		22	402	4.0	0.68	6.18	7.54	200	0.40	0.013	20.74	0.66	72.3	0.05	0.29	299.333	298.249	36.4
A1	Street A	V	U	RC1	RC2	0.75	0.75	2.75	17		47	47	4.3	0.15	0.77	1.01	200	0.60	0.013	25.41	0.81	80.4	0.03	0.48	300.493	299.769	4.0
A1a	Street A	U	T	RC2	RC2a	0.77	1.52	2.75	12		33	80	4.3	0.30	1.30	1.76	200	0.50	0.013	23.19	0.74	80.4	0.03	0.40	299.719	298.995	7.6
A2	Street A	T	S	RC2a	RC3	0.66	2.18	2.75	14		39	118	4.2	0.44	1.91	2.58	200	0.50	0.013	23.19	0.74	80.4	0.03	0.40	298.895	298.222	11.1
A3	Street A	S	R	RC3	RC4	0.49	6.07	2.75	6		17	537	4.0	1.21	8.12	10.26	200	0.40	0.013	20.74	0.66	72.3	0.05	0.29	298.172	297.525	49.5
A31	Beech Street	AE	AD	RC29	RC31	0.66	0.66	2.75	12		33	33	4.3	0.13	0.55	0.75	200	0.45	0.013	22.00	0.70	73.8	0.03	0.33	300.311	299.979	3.4
A32	Beech Street	AD	R	RC31	RC4	0.67	1.33	2.75	12		33	66	4.3	0.27	1.08	1.48	200	2.99	0.013	56.71	1.81	78.5	0.05	2.35	299.879	297.530	2.6
A4a	Street A	R	Q	RC4	RC5	0.46	7.86	2.75	7		19	622	3.9	1.57	9.32	11.98	200	0.56	0.013	24.54	0.78	89.8	0.03	0.50	297.425	296.905	48.8
A25	Street C/F	AC	AB	RC23	RC24	0.77	0.77	2.75	7		19	19	4.4	0.15	0.32	0.52	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	298.704	298.574	2.4
A26	Street C/F	AB	Z	RC24	RC25	0.85	1.62	2.75	10		28	47	4.3	0.32	0.77	1.21	200	0.45	0.013	22.00	0.70	91.7	0.05	0.41	298.524	298.111	5.5
A27	Street C/F	Z	Y	RC25	RC26	0.47	2.09	2.75	4		11	58	4.3	0.42	0.95	1.50	200	0.45	0.013	22.00	0.70	15.0	0.05	0.07	298.061	297.994	6.8
A28	Street C/F	Y	X	RC26	RC27	0.74	2.83	2.75	9		25	83	4.3	0.57	1.34	2.10	200	0.40	0.013	20.74	0.66	101.7	0.05	0.41	297.944	297.537	10.1
A29	Street C/F	X	W	RC27	RC28	0.42	3.25	2.75	4		11	94	4.3	0.65	1.52	2.39	200	0.40	0.013	20.74	0.66	20.8	0.05	0.08	297.487	297.404	11.5
A30	Street C/F	W	Q	RC28	RC5	0.71	3.96	2.75	10		28	121	4.2	0.79	1.95	3.02	200	0.51	0.013	23.42	0.75	85.5	0.05	0.44	297.354	296.905	12.9
A5	Street A	Q	P	RC5	RC6	0.77	12.59	2.75	12		33	776	3.9	2.52	11.47	15.38	200	0.40	0.013	20.74	0.66	101.3	0.05	0.41	296.880	296.475	74.2
A6	Street A	P	O	RC6	RCCAP	0.91	13.50	2.75	14		39	815	3.9	2.70	12.00	16.17	200	1.81	0.013	44.13	1.40	99.4	0.05	1.80	296.435	294.636	36.6
A6	Street A	O	B	RCCAP	RC7	0.00	13.50	2.75	0		0	815	3.9	2.70	12.00	16.17	200	0.40	0.013	20.74	0.66	21.4	0.05	0.09	294.636	294.550	77.9
A7	Street E	A	B	RC18	RC7	0.26	0.26	2.75	4		11	11	4.4	0.05	0.19	0.26	200	0.60	0.013	25.41	0.81	43.1	0.05	0.26	294.893	294.635	1.0
A8	Street E	B	C	RC7	RC9	0.57	14.33	2.75	10		28	853	3.8	2.87	12.52	16.93	200	0.68	0.013	27.05	0.86	86.3	0.05	0.59	294.610	294.160	62.6
A9	Street E	C	D	RC9	RC10	0.65	14.98	2.75	12		33	886	3.8	3.00	12.97	17.57	200	0.64	0.013	26.24	0.84	71.9	0.05	0.46	294.110	293.650	67.0
A10	Street E	D	E	RC10	RC11	0.29	15.27	2.75	1		3	889	3.8	3.05	13.01	17.67	200	0.64	0.013	26.24	0.84	40.5	0.05	0.26	293.600	293.340	67.4
		E	F																								
A11	Street E	F	G	RC11	RC12	0.20	15.47	2.75	1		3	892	3.8	3.09	13.05	17.76	200	0.57	0.013	24.76	0.79	28.1	0.05	0.16	293.310	293.150	71.7
A12	Street E	G	H	RC12	RC40	0.05	15.52	2.75	0		0	892	3.8	3.10	13.05	17.77	200	0.62	0.013	25.83	0.82	36.3	0.05	0.23	293.070	292.924	68.8
A13	Walnut Street	193	M	RC39	RC17	0.12	0.12	2.75	0		0	0	4.5	0.02	0.00	0.03	200	0.40	0.013	20.74	0.66	30.0	0.05	0.12	296.631	296.511	0.1
A14	Walnut Street	N	M	RC30	RC17	0.16	0.16	2.75	6		17	17	4.4	0.03	0.28	0.34	200	0.35	0.013	19.40	0.62	104.9	0.05	0.37	296.907	296.540	1.8
A15	Street E	M	L	RC17	RC16	0.55	0.83	2.75	6		17	33	4.3	0.17	0.55	0.79	200	2.52	0.013	52.07	1.66	29.0	0.05	0.73	296.443	294.950	1.5
A16	Street E	L	K	RC16	RC15	0.50	1.33	2.75	6		17	50	4.3	0.27	0.82	1.19	200	0.60	0.013	25.41	0.81	29.0	0.05	0.17	294.868	294.508	4.7
A17	Street E	K	H	RC15	RC40	0.06	1.39	2.75	0		0	50	4.3	0.28	0.82	1.20	200	0.61	0.013	25.62	0.82	29.0	0.05	0.18	294.464	294.244	4.7
	Street E	H	I	RC40	RC41	0.00	16.91	2.75	0		0	1076	3.8	3.38	15.53	20.81	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.895	292.844	94.6
	Street E	I	J	RC41	RC38	0.00	16.91	2.75	0		0	1076	3.8	3.38	15.53	20.81	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.791	292.761	94.6
	Street E	J		RC38	RCPS	0.00	150.76	2.75	0		0	3368	3.4	30.15	43.73	81.27	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.125	292.115	369.4
A4b	Beech Street		R	RCSTUB	RC4	0.09	0.09	2.75	0		0	0	4.5	0.02	0.00	0.02	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	297.620	297.530	0.1
	Walnut Grove	Force Main	J	MH 2 EX	RC38	6.41	6.41					192															
	Town of Lucan		J		RC38	110.00	116.41					2100															

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN - EXISTING + APPROVED + PROPOSED DEVELOPMENT
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30 units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75 units per hectare @	2.1 people/unit
High Density (Apartments)	150 units per hectare @	1.7 people/unit

Design Criteria

Residential	330 L per capita per day	Infiltration	0.2 L/s per hectare
School	140 L per student per day	Manning's n	0.013
Commercial	45 people per hectare		
Uncertain Development Factor	1.1		

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A1	Francis Street	137	136	137	136	0.77	0.77	2.75	5		14	14	4.4	0.15	0.23	0.42	200	0.48	0.013	22.82	0.73	76.2		0.37	301.83	301.46	1.9
A2	Francis Street	136	134	136	134	1.12	1.89	2.75	8		22	36	4.3	0.38	0.59	1.07	200	0.42	0.013	21.31	0.68	90.2	0.03	0.38	301.43	301.05	5.0
A3	Francis Street	176	134	176	134	1.05	1.05	2.75	8		22	22	4.4	0.21	0.37	0.64	200	0.54	0.013	24.17	0.77	117.3		0.64	301.69	301.05	2.6
A4	Clarence Street	134	133	134	133	0.53	3.47	2.75	5		14	72	4.3	0.69	1.17	2.05	200	0.44	0.013	21.66	0.69	111.9	0.03	0.49	301.02	300.54	9.5
A5	Saintsbury Line	273	283	273	172	1.10	1.10	2.75	3		8	8	4.4	0.22	0.14	0.40	200	0.52	0.013	23.67	0.75	149.7		0.78	301.780	301.00	1.7
A6	Saintsbury Line	284	283	173	172	0.48	0.48	2.75	4		11	11	4.4	0.10	0.19	0.31	200	0.50	0.013	23.19	0.74	116.4		0.58	302.08	301.50	1.3
		283	85	172	85	0.00	1.58	2.75	0		0	19	4.4	0.32	0.32	0.70	200	0.38	0.013	20.11	0.64	22.6		0.08	300.93	300.85	3.5
A7	Saintsbury Line	135	85	135	85	0.46	0.46	2.75	3		8	8	4.4	0.09	0.14	0.25	200	0.7	0.013	27.44	0.87	69.1		0.48	301.19	300.70	0.9
A8	Saintsbury Line	139	85	139	85	0.65	0.65	2.75	7		19	19	4.4	0.13	0.32	0.50	200	0.41	0.013	21.00	0.67	100.0		0.41	301.77	301.36	2.4
A9	Wellington Street	85	133	85	133	0.26	2.95	2.75	2		6	52	4.3	0.59	0.86	1.60	200	0.39	0.013	20.48	0.65	103.3	0.03	0.40	300.66	300.26	7.8
A10	Wellington Street	133	121	133	121	0.19	6.61	2.75	1		3	127	4.2	1.32	2.04	3.69	200	0.42	0.013	21.26	0.68	85.95	0.30	0.36	300.24	299.88	17.4
			120		120	0.20				45	9	9	4.4		0.15	0.17											
A11			120		120			1.60	55		88	88	4.3		1.43	1.57											
	Richmond Street	119	120	119	120	0.99	0.99	2.75	2		6	103	4.2	0.20	1.66	2.05	200	0.40	0.013	20.74	0.66	104.2		0.42	301.782	301.37	9.9
A12	Richmond Street	120	121	120	121	0.92	1.91	2.75	6		17	119	4.2	0.38	1.92	2.53	200	0.39	0.013	20.48	0.65	64.3	0.01	0.25	301.354	301.10	12.4
	Coyne Lane	BD	BC			0.13	0.13	2.75	2		6	6	4.4	0.03	0.09	0.13	200	1.05	0.013	33.61	1.07	23.6		0.25	303.160	302.91	0.4
	Coyne Lane	BC	BB			0.17	0.30	2.75	2		6	11	4.4	0.06	0.19	0.27	200	1.65	0.013	42.13	1.34	26.0	0.02	0.43	302.890	302.46	0.6
	Future Dev	S8	S7			1.50	1.50	2.75	45		124	124	4.2	0.30	1.99	2.52	200	0.33	0.013	18.84	0.60	38.9					
	Street B	S7	S9			0.00	1.50	2.75	0		0	124	4.2	0.30	1.99	2.52	200	0.33	0.013	18.84	0.60	13.0					
Da	Street B	S15	S14			0.27	0.27	2.75	8		22	146	4.2	0.05	2.34	2.63	200	0.55	0.013	24.32	0.77	69.5					
	Street B	S14	S9			0.30	0.57	2.75	9		25	171	4.2	0.11	2.72	3.11	200	0.5	0.013	23.19	0.74	76.8					
	Stuart Avenue	S9	S13			0.00	2.07	2.75	0		0	171	4.2	0.41	2.72	3.44	200	0.33	0.013	18.84	0.60	34.9					
	Stuart Avenue	S13	BB			0.10	2.17	2.75	3		8	179	4.2	0.43	2.84	3.60	200	0.4	0.013	20.74	0.66	46.3					
	Coyne Lane	BB	BA			0.31	2.78	2.75	5		14	204	4.1	0.56	3.22	4.16	200	0.27	0.013	17.04	0.54	77.6	0.04	0.21	302.42	302.21	24.4
	Coyne Lane	BA	AL			0.12	2.90	2.75	2		6	209	4.1	0.58	3.31	4.27	200	0.33	0.013	18.84	0.60	77.6	0.05	0.26	302.16	301.89	22.7
A13	Coyne Lane	BD	BE	221	222	0.98	0.98	2.75	12		33	33	4.3	0.20	0.55	0.82	200	0.43	0.013	21.51	0.68	100.0		0.43	303.17	302.74	3.8
A14	Coyne Lane	BE	AQ	222	228	0.20	1.18	2.75	2		6	39	4.3	0.24	0.64	0.96	200	0.33	0.013	18.84	0.60	52.0	0.03	0.17	302.71	302.54	5.1
	Spencer Avenue	AZ	AY			0.35	0.35	2.75	4		11	11	4.4	0.07	0.19	0.28	200	0.32	0.013	18.55	0.59	22.4		0.07	304.54	304.47	1.5
	Spencer Avenue	AY	AX			0.43	0.78	2.75	8		22	33	4.3	0.16	0.55	0.77	200	0.28	0.013	17.36	0.55	56.4	0.05	0.16	304.42	304.26	4.5
	Spencer Avenue	AX	AW			0.40	1.18	2.75	8		22	55	4.3	0.24	0.90	1.25	200	0.29	0.013	17.66	0.56	59.1	0.07	0.17	304.19	304.02	7.1
DC	Verhoog		AW			0.42	0.42	1.70	63		107	107	4.2	0.08	1.73	2.00											
	Spencer Avenue	AW	AV			0.20	1.80	0.00	3		0	162	4.2	0.36	2.59	3.24	200	0.34	0.013	19.12	0.61	52.8	0.05	0.18	303.97	303.79	17.0
DDb	Olde Clover Drive	S21	AV			0.17	0.17	2.75	5		14	14	4.4	0.03	0.23	0.29	200	0.33	0.013	18.84	0.60	74.4					
	Spencer Avenue	AV	AU			0.50	2.47	2.75	8		22	198	4.1	0.49	3.14	3.99	200	0.31	0.013	18.26	0.58	72.8	-303.74	0.23	303.74	303.52	21.9
	Spencer Avenue	AU	AT			0.24	2.71	2.75	4		11	209	4.1	0.54	3.30	4.23	200	0.33	0.013	18.84	0.60	49.2	0.03	0.16	303.49	303.33	22.4
	Spencer Avenue	AT	AS			0.06	2.77	2.75	3		8	217	4.1	0.55	3.43	4.38	200	0.33	0.013	18.84	0.60	26.7	0.03	0.09	303.3	303.21	23.2
	Spencer Avenue	AS	AR			0.36	3.13	2.75	5		14	231	4.1	0.63	3.64	4.69	200	0.26	0.013	16.72	0.53	64.2	0.05	0.17	303.16	302.99	28.0
	Future Dev		S22			1.60	1.60	2.75	48		132	132	4.2	0.32	2.12	2.69											
	Street A	S22	S21			0.07	1.67	2.75	2		6	138	4.2	0.33	2.21	2.79	200	0.65	0.013	26.44	0.84	29.8					
	Street A	S21	S20			0.13	1.80	2.75	4		11	149	4.2	0.36	2.38	3.01	200	0.33	0.013	18.84	0.60	49.0					
DDc	Street A	S20	S19			0.20	2.00	2.75	6		17	165	4.2	0.40	2.63	3.34	200	0.33	0.013	18.84	0.60	51.0					
	Street A	S19	S16			0.07	2.07	2.75	2		6	171	4.2	0.41	2.72	3.44	200	0.33	0.013	18.84	0.60	64.3					
	Street B	S15	S16			0.27	0.27	2.75	8		22	22	4.4	0.05	0.37	0.46	200	0.8	0.013	29.34	0.93	68.6					
	Street B	S16	BG			0.03	2.37	2.75	1		3	195	4.2	0.47	3.10	3.93	200	0.25	0.013	16.40	0.52	21.6					
	Spencer Avenue	BG	AR			0.08	2.45	2.75	1		3	198	4.1	0.49	3.14	3.99	200	0.32	0.013	18.55	0.59	32.3		0.10	303.1	303	21.5
A15	Spencer Avenue	AR	AQ	219	228	0.49	6.06	2.75	11		30	459	4.0	1.21	7.00	9.04	200	0.33	0.013	18.84	0.60	50.6	0.03	0.17	302.71	302.54	48.0
A16	Spencer Avenue	AQ	AP	228	220	0.20	7.44	2.75	2		6	503	4.0	1.49	7.63	10.04	200	0.33	0.013	18.84	0.60	40.3	0.03	0.13	302.51	302.38	53.3

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30	units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75	units per hectare @	2.1 people/unit
High Density (Apartments)	150	units per hectare @	1.7 people/unit

Design Criteria

Residential	330	L per capita per day	Infiltration	0.2	L/s per hectare
School	140	L per student per day	Manning's n	0.013	
Commercial	45	people per hectare			
Uncertain Development Factor	1.1				

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
	Easement	AP	BF	220	229	0.00	7.44				0	503	4.0	1.49	7.63	10.04	200	0.33	0.013	18.84	0.60	100.0	0.03	0.33	302.35	302.02	53.3
	Easement	BF	35	229	35	0.00	7.44				0	503	4.0	1.49	7.63	10.04	200	0.33	0.013	18.84	0.60	35.3	0.03	0.12	301.99	301.87	53.3
A17	Richmond Street	285	35	177	35	0.50	0.50			45	23	23	4.4	0.10	0.38	0.53	200	0.61	0.013	25.62	0.82	45.0		0.27	302.19	301.91	2.1
A18	Richmond Street	35	34	35	34	1.99	9.93			45	90	616	3.9	1.99	9.24	12.35	200	0.40	0.013	20.74	0.66	90.0	0.01	0.36	301.90	301.54	59.5
	Richmond Street	34	272	34		0.00	9.93				0	616	3.9	1.99	9.24	12.35	200	0.40	0.013	20.74	0.66	55.0	0.03	0.22	-0.03	-0.25	59.5
	Richmond Street	272	271		271	0.00	9.93				0	616	3.9	1.99	9.24	12.35	200	0.40	0.013	20.74	0.66	55.0	0.03	0.22	301.51	301.29	59.5
A19			270		270	0.54				45	25	25	4.4		0.41	0.45											
	Richmond Street	271	270	271	270	1.01	10.94	2.75	4		11	652	3.9	2.19	9.74	13.12	200	0.54	0.013	24.10	0.77	88.1	0.01	0.48	301.28	300.81	54.4
A20	Richmond Street	270	121	270	121	1.10	12.04	2.75	10		28	679	3.9	2.41	10.12	13.79	200	0.40	0.013	20.74	0.66	88.4		0.35	300.81	300.46	66.5
A21	Elm Street	121	38	121	38	0.23	20.79	2.75	1		3	928	3.8	4.16	13.54	19.47	200	0.38	0.013	20.11	0.64	109.4	0.03	0.41	299.85	299.44	96.8
A22	Fairview Place	140	39	140	39	0.75	0.75	2.75	6		17	17	4.4	0.15	0.28	0.47	200	0.47	0.013	22.49	0.72	63.7		0.30	300.38	300.08	2.1
A23	Saintsbury Line	276	178	276	178	0.41	0.41	2.75	2		6	6	4.4	0.08	0.09	0.19	200	0.73	0.013	27.97	0.89	55.0		0.40	301.08	300.68	0.7
A24	Langford Drive	178	146	178	146	0.58	0.99	2.75	3		8	14	4.4	0.20	0.23	0.47	200	0.43	0.013	21.46	0.68	67.7	0.08	0.29	300.60	300.31	2.2
A25	Langford Drive	146	39	146	39	1.11	2.10	2.75	5		14	28	4.4	0.42	0.46	0.97	200	0.37	0.013	19.95	0.64	87.5		0.32	300.28	299.96	4.8
A26	Langford Drive	39	147	39	147	0.56	3.41	2.75	5		14	41	4.3	0.68	0.68	1.50	200	0.35	0.013	19.40	0.62	63.7	0.03	0.22	299.93	299.71	7.7
A27	Langford Drive	147	38	147	38	0.53	3.94	2.75	4		11	52	4.3	0.79	0.86	1.81	200	0.39	0.013	20.48	0.65	64.6	0.03	0.25	299.68	299.43	8.9
A28	Langford Drive	141	38	141	38	0.86	0.86	2.75	5		14	14	4.4	0.17	0.23	0.44	200	0.55	0.013	24.32	0.77	63.4		0.35	300.21	299.86	1.8
	Elm Street	38	122	38	122	0.00	25.59				0	994	3.8	5.12	14.43	21.50	200	0.52	0.013	23.65	0.75	32.6	0.02	0.17	299.42	299.25	90.9
A29	Watson Street	245	246	245	246	1.04	1.04	2.75	11		30	30	4.4	0.21	0.50	0.78	200	0.70	0.013	27.44	0.87	80.4		0.56	301.90	301.34	2.9
A30	Watson Street	246	247	246	247	0.17	1.21	2.75	2		6	36	4.3	0.24	0.59	0.92	200	0.40	0.013	20.74	0.66	41.0	0.01	0.16	301.33	301.16	4.4
A31	Radcliffe Crescent	247	248	247	248	0.51	1.72	2.75	8		22	58	4.3	0.34	0.95	1.42	200	0.40	0.013	20.74	0.66	64.9	0.02	0.26	301.14	300.88	6.9
A32	Radcliffe Crescent	248	249	248	249	0.25	1.97	2.75	2		6	63	4.3	0.39	1.04	1.57	200	0.40	0.013	20.74	0.66	20.0	0.01	0.08	300.87	300.79	7.6
A33	Radcliffe Crescent	249	250	249	250	0.11	2.08	2.75	1		3	66	4.3	0.42	1.08	1.65	200	0.40	0.013	20.74	0.66	23.0	0.01	0.09	300.78	300.69	7.9
A34	Radcliffe Crescent	247	253	247	253	0.37	0.37	2.75	8		22	22	4.4	0.07	0.37	0.49	200	0.70	0.013	27.44	0.87	71.0		0.50	301.66	301.16	1.8
A35	Radcliffe Crescent	182	253	182	253	1.02	1.02	2.75	11		30	30	4.4	0.20	0.50	0.78	200	0.70	0.013	27.44	0.87	125.0		0.88	302.04	301.16	2.8
A36	Radcliffe Crescent	253	252	253	252	0.52	1.91	2.75	8		22	74	4.3	0.38	1.21	1.75	200	0.43	0.013	21.53	0.69	64.9	0.00	0.28	301.16	300.88	8.1
A37	Radcliffe Crescent	252	251	252	251	0.15	2.06	2.75	1		3	77	4.3	0.41	1.26	1.84	200	0.40	0.013	20.74	0.66	20.0	0.01	0.08	300.87	300.79	8.8
A38	Radcliffe Crescent	251	250	251	250	0.19	2.25	2.75	2		6	83	4.3	0.45	1.34	1.97	200	0.45	0.013	22.10	0.70	19.0	0.01	0.09	300.78	300.70	8.9
	Easement	250	43	250	43	0.00	4.33				0	149	4.2	0.87	2.38	3.57	200	0.40	0.013	20.74	0.66	122	0.02	0.49	300.68	300.19	17.2
	Easement	43	44	43	44	0.00	4.33				0	149	4.2	0.87	2.38	3.57	200	0.50	0.013	23.19	0.74	8.2	0.00	0.04	300.19	300.15	15.4
A39	Saintsbury Line	180	181	180	181	1.45	1.45	2.75	6		17	17	4.4	0.29	0.28	0.62	200	0.50	0.013	23.19	0.74	120.0		0.60	302.18	301.58	2.7
A40		181	273	181	163	1.03	2.48	2.75	4		11	28	4.4	0.50	0.46	1.05	200	0.70	0.013	27.44	0.87	120.0	0.01	0.84	301.57	300.73	3.8
A41	Nicoline Avenue	273	274	163	164	1.44	3.92	2.75	3		8	36	4.3	0.78	0.59	1.51	200	0.40	0.013	20.61	0.66	98.5	0.04	0.39	300.69	300.30	7.3
A42	Nicoline Avenue	274	44	164	44	1.67	5.59	2.75	4		11	47	4.3	1.12	0.77	2.08	200	0.39	0.013	20.59	0.66	90.0	0.01	0.35	300.29	299.93	10.1
A43	Nicoline Avenue	44	41	44	41	1.03	10.95	2.75	5		14	209	4.1	2.19	3.31	6.05	200	0.42	0.013	21.26	0.68	67.5	0.01	0.28	299.92	299.64	28.4
A44	John Street	235	52	235	52	0.49	0.49	2.75	5		14	14	4.4	0.10	0.23	0.36	200	0.72	0.013	27.81	0.89	88.5		0.64	300.80	300.16	1.3
	John Street	52	47	52	47	0.00	0.49				0	14	4.4	0.10	0.23	0.36	200	0.50	0.013	23.19	0.74	8.2	0.00	0.04	300.12	300.08	1.6
A45	Nicoline Avenue	48	47	48	47	0.68	0.68	2.75	9		25	25	4.4	0.14	0.41	0.60	200	0.34	0.013	19.12	0.61	75.3		0.26	300.41	300.15	3.2
A46	Nicoline Avenue	47	46	47	46	0.25	1.42	2.75	3		8	47	4.3	0.28	0.77	1.16	200	0.34	0.013	19.12	0.61	45.7	0.01	0.16	300.15	299.99	6.1
A47	Nicoline Avenue	46	45	46	45	0.24	1.66	2.75	3		8	55	4.3	0.33	0.90	1.36	200	0.34	0.013	19.12	0.61	41.1	0.00	0.14	299.99	299.85	7.1
A48	Nicoline Avenue	45	41	45	41	1.26	2.92	2.75	3		8	63	4.3	0.58	1.04	1.78	200	0.34	0.013	19.12	0.61	50.9	0.00	0.17	299.85	299.68	9.3
A49	Elm Street	41	179	41	179	0.30	14.17	2.75	2		6	278	4.1	2.83	4.34	7.89	200	0.34	0.013	19.12	0.61	88.1	0.02	0.30	299.66	299.36	41.3
A50	Harold Court	274	61	274	61	0.92	0.92	2.75	13		36	36	4.3	0.18	0.59	0.85	200	1.00	0.013	32.80	1.04	96.0		0.96	300.57	299.61	2.6
A51	Harold Court	61	179	61	179	0.40	1.32	2.75	5		14	50	4.3	0.26	0.82	1.19	200	0.34	0.013	19.12	0.61	65.5	0.00	0.22	299.61	299.39	6.2

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30	units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75	units per hectare @	2.1 people/unit
High Density (Apartments)	150	units per hectare @	1.7 people/unit

Design Criteria

Residential	330	L per capita per day	Infiltration	0.2	L/s per hectare
School	140	L per student per day	Manning's n	0.013	
Commercial	45	people per hectare			
Uncertain Development Factor	1.1				

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A52	Elm Street	179	42	179	42	0.33	15.82	2.75	1		3	330	4.1	3.16	5.12	9.11	200	0.34	0.013	19.12	0.61	31.1	0.03	0.11	299.36	299.25	47.6
	Elm Street	42	40	42	40	0.00	15.82				0	330	4.1	3.16	5.12	9.11	200	0.34	0.013	19.12	0.61	25.9	0.00	0.09	299.25	299.16	47.6
A53	Elm Street	40	122	40	122	0.33	16.15	2.75	2		6	336	4.1	3.23	5.20	9.27	200	0.34	0.013	19.12	0.61	86.9	0.00	0.30	299.16	298.87	48.5
A54	Easement	122	148	122	148	1.41	43.15				0	1329	3.7	8.63	18.87	30.25	300	0.53	0.013	70.40	1.00	112.8	0.43	0.60	298.82	298.23	43.0
	Easement	148	64	148	64	0.00	43.15				0	1329	3.7	8.63	18.87	30.25	300	0.24	0.013	47.37	0.67	20.4	0.03	0.05	298.20	298.15	63.9
A55	Albert Street	123	291	123	275	0.73	0.73	2.75	9		25	25	4.4	0.15	0.41	0.61	200	1.14	0.013	35.02	1.11	63.1		0.72	300.90	300.19	1.8
A56	Albert Street	291	64	275	64	0.71	1.44	2.75	7		19	44	4.3	0.29	0.73	1.12	200	1.12	0.013	34.71	1.10	71.9	0.02	0.81	300.17	299.36	3.2
	Easement	64	62	64	62	0.00	44.59				0	1373	3.7	8.92	19.44	31.20	300	0.20	0.013	43.25	0.61	11.0	1.25	0.02	298.11	298.09	72.1
A57	Watson Street	244	243	244	243	0.27	0.27	2.75	3		8	8	4.4	0.05	0.14	0.21	200	0.70	0.013	27.44	0.87	35.0	0.03	0.25	300.60	300.36	0.8
A58	Watson Street	243	242	243	242	0.85	1.12	2.75	11		30	39	4.3	0.22	0.64	0.95	200	0.70	0.013	27.44	0.87	96.0	0.03	0.67	300.33	299.66	3.5
A59	Watson Street	242	240	242	240	0.98	2.10	2.75	13		36	74	4.3	0.42	1.21	1.80	200	0.40	0.013	20.74	0.66	96.0	0.03	0.38	299.64	299.25	8.7
A60	Watson Street	240	241	240	241	0.39	2.49	2.75	3		8	83	4.3	0.50	1.34	2.03	200	0.40	0.013	20.74	0.66	16.3	0.03	0.07	299.23	299.16	9.8
A61	Watson Street	241	234	241	234	0.54	3.03	2.75	6		17	99	4.2	0.61	1.61	2.43	200	0.40	0.013	20.74	0.66	92.9	0.03	0.37	299.14	298.77	11.7
A62	John Street	243	235	243	235	0.53	0.53	2.75	6		17	17	4.4	0.11	0.28	0.42	200	0.70	0.013	27.44	0.87	93.8	0.03	0.66	300.52	299.86	1.5
A63	Joseph Street	235	236	235	236	0.93	1.46	2.75	12		33	50	4.3	0.29	0.82	1.22	200	0.60	0.013	25.41	0.81	99.0	0.03	0.59	299.84	299.25	4.8
A64	Joseph Street	236	237	236	237	0.69	2.15	2.75	9		25	74	4.3	0.43	1.21	1.81	200	0.40	0.013	20.74	0.66	81.8	0.03	0.33	299.22	298.89	8.7
A65	Joseph Street	237	234	237	234	0.26	2.41	2.75	3		8	83	4.3	0.48	1.34	2.01	200	0.40	0.013	20.74	0.66	25.8	0.03	0.10	298.87	298.77	9.7
A66	Joseph Street	238	239	238	239	0.18	0.18	2.75	2		6	6	4.4	0.04	0.09	0.14	200	0.70	0.013	27.44	0.87	17.0	0.03	0.12	299.08	298.96	0.5
A67	Joseph Street	239	234	239	234	0.11	0.29	2.75	1		3	8	4.4	0.06	0.14	0.22	200	0.70	0.013	27.44	0.87	24.5	0.03	0.17	298.94	298.77	0.8
	Watson Street	234	NPS	234	PS	0.00	5.73				0	190	4.2	1.15	3.01	4.57	200	0.40	0.013	20.74	0.66	10.0	0.03	0.04	298.74	298.70	22.1
	Easement	NPS	232	PS	232	0.00	5.73				0	847	3.8	1.15	12.44	14.94	200	0.40	0.013	20.74	0.66	43.7		0.17	300.33	300.15	72.0
	Easement	232	50	232	50	0.00	5.73				0	847	3.8	1.15	12.44	14.94	250	0.30	0.013	32.57	0.66	45.7		0.14	300.09	299.95	45.9
A68	Nicoline Avenue	51	50	51	50	0.39	0.39	2.75	4		11	11	4.4	0.08	0.19	0.29	200	0.34	0.013	19.12	0.61	39.6		0.13	300.12	299.98	1.5
A69	Nicoline Avenue	48	49	48	49	0.72	0.72	2.75	10		28	28	4.4	0.14	0.46	0.66	200	0.34	0.013	19.12	0.61	76.2		0.26	300.43	300.17	3.5
A70	Nicoline Avenue	49	50	49	50	0.44	1.16	2.75	5		14	41	4.3	0.23	0.68	1.01	200	0.34	0.013	19.12	0.61	54.9	0.00	0.19	300.17	299.98	5.3
A71	Kleinfeldt Avenue	50	56	50	56	0.37	7.65	2.75	4		11	910	3.8	1.53	13.30	16.31	250	0.28	0.013	31.47	0.64	71.0	0.03	0.20	299.95	299.75	51.8
A72	Kleinfeldt Avenue	56	55	56	55	0.71	8.36	2.75	10		28	938	3.8	1.67	13.67	16.88	250	0.28	0.013	31.47	0.64	81.4	0.00	0.23	299.75	299.53	53.6
A73	Kleinfeldt Avenue	55	54	55	54	0.25	8.61	2.75	3		8	946	3.8	1.72	13.79	17.06	250	0.25	0.013	29.73	0.61	47.2	0.25	0.12	299.28	299.16	57.4
A74	Kleinfeldt Avenue	53	54	53	54	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	0.30	0.013	17.96	0.57	29.6		0.09	299.25	299.16	1.2
A75	Marlene Street	54	57	54	57	0.62	9.52	2.75	8		22	976	3.8	1.90	14.19	17.71	250	0.25	0.013	29.73	0.61	76.2	0.02	0.19	299.14	298.95	59.6
A76	Marlene Street	57	58	57	58	0.51	10.03	2.75	6		17	993	3.8	2.01	14.42	18.06	250	0.25	0.013	29.73	0.61	77.1	0.02	0.19	298.94	298.74	60.8
A77	Harold Court	59	60	59	60	1.19	1.19	2.75	13		36	36	4.3	0.24	0.59	0.91	200	1.00	0.013	32.80	1.04	56.7		0.57	301.66	301.09	2.8
A78	Albert Street	60	65	60	65	0.24	1.43	2.75	2		6	41	4.3	0.29	0.68	1.07	200	2.00	0.013	46.38	1.48	61.0	0.07	1.22	301.03	299.81	2.3
A79	Albert Street	65	58	65	58	0.46	1.89	2.75	6		17	58	4.3	0.38	0.95	1.46	200	2.00	0.013	46.38	1.48	52.4	0.02	1.05	299.79	298.74	3.1
A80	Albert Street	58	294	58	199	0.08	12.00				0	1051	3.8	2.40	15.19	19.35	200	0.75	0.013	28.40	0.90	40.2	0.02	0.30	298.73	298.43	68.1
A81	Albert Street	294	63	199	63	0.32	12.32	2.75	2		6	1056	3.8	2.46	15.26	19.50	200	0.20	0.013	14.67	0.47	48.8	0.01	0.10	298.42	298.32	133.0
		63	62	63	62	0.00	12.32				0	1056	3.8	2.46	15.26	19.50	200	0.20	0.013	14.67	0.47	12.2	0.00	0.02	298.32	298.29	133.0
	Easement	62	198	62	198	0.00	56.91				0	2429	3.5	11.38	32.65	48.43	300	0.20	0.013	43.25	0.61	60.0	0.00	0.12	298.09	297.97	112.0
	Easement	198	197	198	197	0.00	56.91				0	2429	3.5	11.38	32.65	48.43	300	0.25	0.013	48.35	0.68	71.3	0.34	0.18	297.95	297.77	100.2
	Easement	197	33	197	33	0.00	56.91				0	2429	3.5	11.38	32.65	48.43	300	0.19	0.013	42.15	0.60	111.9	0.02	0.21	297.76	297.54	114.9
A82	Princess Street	138	67	138	67	1.05	1.05	2.75	9		25	25	4.4	0.21	0.41	0.69	200	1.30	0.013	37.40	1.19	91.7		1.19	301.81	300.61	1.8
A83	Princess Street	67	66	67	66	1.19	2.24	2.75	9		25	50	4.3	0.45	0.82	1.39	200	1.28	0.013	37.05	1.18	91.7	0.48	1.17	300.14	298.96	3.8
A84	Princess Street	66	33	66	33	0.37	2.61	2.75	2		6	55	4.3	0.52	0.90	1.57	200	0.77	0.013	28.69	0.91	75.3	0.04	0.58	298.93	298.35	5.5
	Easement	33	142	33	142	0.00	59.52				0	2484	3.5	11.90	33.31	49.74	300	0.33	0.013	55.55	0.79	102.7	0.83	0.34	297.52	297.18	89.5
A85	Water Street	70	125	70	125	0.56	0.56	2.75	5		14	14	4.4	0.11	0.23	0.38	200	0.53	0.013	23.88	0.76	71.9		0.38	298.31	297.93	1.6
A86	William Street	125	142	125	142	0.47	1.03	2.75	5		14	28	4.4	0.21	0.46	0.73	200	0.47	0.013	22.49	0.72	61.3	0.03	0.29	297.90	297.61	3.2
A87	William Street	142	128	142	128	0.37	60.92	2.75	2		6	2517	3.5	12.18	33.71	50.48	300	0.33	0.013	55.55	0.79	38.4	0.45	0.13	297.16	297.03	90.9
A88	William Street	126	127	126	127	1.03	1.03			45	47	47	4.3	0.21	0.77	1.08	200	1.02	0.013	33.12	1.05	63.4		0.65	300.22	299.58	3.2
A89	William Street	127	128	127	128	0.69	1.72	2.75	8		22	69	4.3	0.34	1.13	1.62	200	2.21	0.013	48.76	1.55	74.7	0.03	1.65	299.55	297.90	3.3

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30	units per hectare @	2.75 people/unit
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Design Criteria

Residential	330	L per capita per day	Infiltration	0.2	L/s per hectare
School	140	L per student per day	Manning's n	0.013	
Commercial	45	people per hectare			
Uncertain Development Factor	1.1				

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A90	Frank Street	128	68	128	68	0.59	63.23	2.75	7		19	2605	3.5	12.65	34.76	52.15	375	0.36	0.013	105.20	0.95	73.8	0.91	0.27	296.98	296.72	49.6
A91	Frank Street		69		69	0.68				45	31	31	4.4		0.51	0.57	375										
A91	Frank Street	68	69	68	69	1.26	64.49	2.75	7		19	2655	3.5	12.90	35.36	53.09	375	0.25	0.013	87.67	0.79	88.4	0.03	0.22	296.69	296.47	60.6
A92	Frank Street	69	23	69	23	0.45	64.94	2.75	7		19	2675	3.5	12.99	35.59	53.44	300	0.25	0.013	48.35	0.68	89.9	0.03	0.22	296.44	296.21	110.5
A93	Spencer Avenue	AP	AO	220	226	0.28	0.28	2.75	6		17	17	4.4	0.06	0.28	0.37	200	0.33	0.013	18.84	0.60	64.1		0.21	302.61	302.40	1.9
A94	Spencer Avenue	AO	AN	226	227	0.80	1.08	2.75	2		6	22	4.4	0.22	0.37	0.64	200	0.33	0.013	18.84	0.60	29.0	0.03	0.10	302.37	302.27	3.4
A95	Spencer Avenue	AN	AM	227	224	0.49	1.57	2.75	5		14	36	4.3	0.31	0.59	1.00	200	0.33	0.013	18.84	0.60	34.9	0.03	0.12	302.24	302.13	5.3
A96	Spencer Avenue	AM	AL	224	223	0.40	1.97	2.75	5		14	50	4.3	0.39	0.82	1.33	200	0.33	0.013	18.84	0.60	49.7	0.03	0.16	302.10	301.94	7.1
A97	Spencer Avenue	AL	AK	223	225	0.79	5.66	2.75	10		28	286	4.1	1.13	4.46	6.16	200	0.33	0.013	18.84	0.60	93.2	0.03	0.31	301.91	301.60	32.7
DDd	Street B	S7	S6			0.21	0.21	2.10	16		34	34	4.3	0.04	0.56	0.66	200	0.5	0.013	23.19	0.74	68.4					
	Street B	S6	S4			0.00	0.21	2.75	0		0	34	4.3	0.04	0.56	0.66	200	0.33	0.013	18.84	0.60	22.1					
	Abbey Lane		S5			5.40	5.40	2.75	162		446	446															
	Abbey Lane	S5	S4			0.10	5.50	2.75	3		8	454	4.0	1.10	6.92	8.83	200	0.65	0.013	26.44	0.84	46.8					
	Abbey Lane	S4	S3			0.13	5.85	2.75	4		11	498	4.0	1.17	7.57	9.61	200	0.33	0.013	18.84	0.60	62.2					
	Abbey Lane	S3	S2			0.27	6.11	2.75	8		22	520	4.0	1.22	7.88	10.01	200	0.33	0.013	18.84	0.60	65.0					
	Abbey Lane	S2	S1			0.27	6.38	2.75	8		22	542	4.0	1.28	8.19	10.42	200	0.4	0.013	20.74	0.66	70.0					
	Abbey Lane	S1	AK			0.13	6.51	2.75	4		11	553	4.0	1.30	8.35	10.62	200	0.33	0.013	18.84	0.60	82.2					
A98	Spencer Avenue	AK	AJ	225	213	0.56	12.73	2.75	5		14	853	3.8	2.55	12.52	16.58	200	0.33	0.013	18.84	0.60	70.8	0.03	0.23	301.57	301.33	88.0
A99	Spencer Avenue	AJ	AI	213	218	0.05	12.78	2.75	5		14	867	3.8	2.56	12.71	16.79	200	0.33	0.013	18.84	0.60	20.2	0.03	0.07	301.30	301.24	89.1
A100	Spencer Avenue	AI	230	218	230	0.13	12.91	2.75	5		14	881	3.8	2.58	12.90	17.03	200	0.33	0.013	18.84	0.60	73.1	0.03	0.24	301.21	300.97	90.4
A101	Saintsbury Line	230	231	230	231	0.56	13.47				0	881	3.8	2.69	12.90	17.15	200	0.23	0.013	15.79	0.50	98.6	0.05	0.23	300.92	300.69	108.6
	Saintsbury Line	231	86	231	86	0.00	13.47				0	881	3.8	2.69	12.90	17.15	200	0.25	0.013	16.40	0.52	11.0	0.03	0.03	300.66	300.63	104.6
	Saintsbury Line	86	84	86	84																				300.60	300.44	
A102	Saintsbury Line	86	87	86	87	1.26	14.73	2.75	3		8	889	3.8	2.95	13.01	17.55	200	0.56	0.013	24.54	0.78	76.3	0.03	0.43	300.60	300.17	71.5
A103	Saintsbury Line	174	87	174	87	0.72	0.72	2.75	2		6	6	4.4	0.14	0.09	0.26	200	0.68	0.013	27.05	0.86	45.5		0.31	300.46	300.15	1.0
	Market Street	87	83	87	83	0.00	15.45				0	894	3.8	3.09	13.09	17.79	200	0.25	0.013	16.40	0.52	19.3	0.05	0.05	300.10	300.05	108.5
A104	Alice Street	175	84	175	84	0.86	0.86	2.75	9		25	25	4.4	0.17	0.41	0.64	200	0.52	0.013	23.65	0.75	82.3		0.43	300.87	300.44	2.7
A105	Saintsbury Line	84	83	84	83	0.11	0.97	2.75	1		3	28	4.4	0.19	0.46	0.72	200	0.33	0.013	18.84	0.60	87.5	0.08	0.29	300.36	300.10	3.8
A106	Market Street	83	153	83	153	0.72	17.14	2.75	5		14	936	3.8	3.43	13.65	18.78	200	0.41	0.013	21.08	0.67	77.5	0.05	0.32	300.05	299.73	89.1
A107	Market Street	153	22	153	22	0.96	18.10	2.75	7		19	955	3.8	3.62	13.91	19.28	200	0.36	0.013	19.81	0.63	82.2	0.03	0.30	299.70	299.40	97.3
A108	Market Street	22	152	22	152	1.16	19.26	2.75	7		19	974	3.8	3.85	14.17	19.82	200	0.41	0.013	21.07	0.67	94.5	0.03	0.39	299.37	298.98	94.1
A109	Market Street	152	4	152	4	1.31	20.57				0	974	3.8	4.11	14.17	20.11	200	0.95	0.013	31.97	1.02	90.5	0.02	0.86	298.9599957	298.10	62.9
A110	Duchess Avenue	18	156	18	156	1.87	1.87	2.75	13		36	36	4.3	0.37	0.59	1.06	200	1.00	0.013	32.86	1.05	122.5		1.23	300.85	299.62	3.2
A111	Duchess Avenue	156	19	156	19	0.42	2.29	2.75	2		6	41	4.3	0.46	0.68	1.25	200	0.40	0.013	20.74	0.66	37.2	0.05	0.15	299.57	299.42	6.0
A112	Duchess Avenue	19	20	19	20	0.47	2.76	2.75	2		6	47	4.3	0.55	0.77	1.46	200	0.53	0.013	23.88	0.76	52.7	0.02	0.28	299.39	299.11	6.1
A113	Lewis Avenue	21	20	21	20	0.95	0.95	2.75	8		22	22	4.4	0.19	0.37	0.61	200	0.62	0.013	25.83	0.82	84.7		0.53	299.63	299.10	2.4
A114	Duchess Avenue	20	5	20	5	0.67	4.38	2.75	2		6	74	4.3	0.88	1.21	2.30	200	0.45	0.013	22.00	0.70	106.1	0.02	0.48	299.09	298.61	10.4
A115	Beech Street	275	5	165	5	0.72	0.72	2.75	6		17	17	4.4	0.14	0.28	0.46	200	0.60	0.013	25.41	0.81	73.2		0.44	299.44	299.00	1.8
A116			189		189	0.56		1.70	150		255	255															
	Beech Street	5	189	5	189	0.99	6.09	2.75	2		6	351	4.0	1.22	5.43	7.31	200	0.34	0.013	19.18	0.61	63.4	0.41	0.22	298.59	298.37	38.1
A117	Beech Street	189	4	189	4	0.29	6.38	2.75	2		6	357	4.0	1.28	5.51	7.47	200	0.39	0.013	20.40	0.65	62.5	0.02	0.24	298.35	298.11	36.6
A118	Market Street	4	151	4	151	0.77	27.72	2.75	5		14	1345	3.7	5.54	19.07	27.08	200	0.41	0.013	20.99	0.67	63.5	0.03	0.26	298.07	297.81	129.0
A119		151	150	151	150	0.31	28.03	2.75	3		8	1353	3.7	5.61	19.18	27.26	200	0.43	0.013	21.54	0.69	64.9	0.02	0.28	297.7899979	297.51	126.5
A120	Alice Street	154	155	154	155	1.06	1.06	2.75	9		25	25	4.4	0.21	0.41	0.69	200	0.34	0.013	19.12	0.61	82.6		0.28	301.47	301.19	3.6
A121	Alice Street	155	295	155	183	0.35	1.41	2.75	3		8	33	4.3	0.28	0.55	0.91	200	0.39	0.013	20.48	0.65	41.1	0.03	0.16	301.16	301.00	4.5
A122	Alice Street	295	124	183	124	1.12	2.53	2.75	10		28	61	4.3	0.51	0.99	1.65	200	0.30	0.013	17.96	0.57	109.7	0.03	0.33	300.97	300.64	9.2
A123	Alice Street	124	185	124	185	0.68	3.21			45	31	91	4.3	0.64	1.49	2.34	200	0.38	0.013	20.19	0.64	37.8	0.00	0.14	300.64	300.50	11.6

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30	units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75	units per hectare @	2.1 people/unit
High Density (Apartments)	150	units per hectare @	1.7 people/unit

Design Criteria

Residential	330	L per capita per day	Infiltration	0.2	L/s per hectare
School	140	L per student per day	Manning's n	0.013	
Commercial	45	people per hectare			
Uncertain Development Factor	1.1				

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design						Profile			
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
	Easement	185	186	185	186	0.00	3.21				0	91	4.3	0.64	1.49	2.34	200	0.54	0.013	24.10	0.77	66.1		0.36	300.50	300.14	9.7
A124	Easement	186	184	186	184	0.68	3.89			45	31	122	4.2	0.78	1.97	3.02	200	1.38	0.013	38.53	1.23	73.2	0.03	1.01	300.11	299.10	7.8
A125	Easement	184	187	184	187	0.64	4.53			45	29	151	4.2	0.91	2.42	3.66	200	1.21	0.013	36.08	1.15	55.2	0.03	0.67	299.07	298.40	10.1
A126	Easement	187	150	187	150	0.56	5.09			45	25	177	4.2	1.02	2.81	4.22	200	1.29	0.013	37.18	1.18	44.8	0.02	0.58	298.38	297.80	11.3
A127	Market Street	150	23	150	23	0.06	33.18				0	1530	3.7	6.64	21.46	30.91	200	0.42	0.013	21.26	0.68	40.5	0.03	0.17	297.78	297.61	145.4
A128	Oak Street	23	24	23	24	0.09	98.21	2.75	2		6	4210	3.3	19.64	53.28	80.21	375	0.49	0.013	122.73	1.11	28.6	1.40	0.14	296.21	296.07	65.4
A129	Duchess Avenue	31	149	31	149	1.22	1.22	2.75	11		30	30	4.4	0.24	0.50	0.82	200	0.41	0.013	21.00	0.67	94.4		0.39	299.75	299.36	3.9
A130	Oak Street	149	25	149	25	0.41	1.63	2.75	3		8	39	4.3	0.33	0.64	1.06	200	2.57	0.013	52.58	1.67	63.1	0.06	1.62	299.31	297.68	2.0
A131	Butler Street	144	145	144	145	0.75	0.75	2.75	4		11	11	4.4	0.15	0.19	0.37	200	0.41	0.013	21.00	0.67	69.5		0.28	297.31	297.02	1.8
A132		145	25	145	25	0.22	0.97	2.75	1		3	14	4.4	0.19	0.23	0.47	200	0.43	0.013	21.43	0.68	72.2	0.02	0.31	297.00	296.69	2.2
A133	Oak Street	25	24	25	24	0.15	2.75	2.75	2		6	58	4.3	0.55	0.95	1.65	200	0.71	0.013	27.64	0.88	35.4	0.07	0.25	296.62	296.37	6.0
A134	Easement	24	188	24	188	0.33	101.29	2.75	3		8	4276	3.3	20.26	54.01	81.70	375	0.38	0.013	108.36	0.98	47.9	0.33	0.18	296.04	295.86	75.4
A135	Easement	188	191	188	191	1.40	102.69	2.75	10		28	4303	3.3	20.54	54.32	82.34	375	0.20	0.013	78.21	0.71	94.8	0.03	0.19	295.83	295.64	105.3
A136	Easement	191	30	191	30	0.39	103.08	2.75	4		11	4314	3.3	20.62	54.44	82.56	375	0.22	0.013	82.42	0.75	96.9	0.03	0.21	295.61	295.39	100.2
A137	Water Street	71	72	71	72	0.29	0.29	2.75	2		6	6	4.4	0.06	0.09	0.17	200	0.50	0.013	23.19	0.74	24.3		0.12	297.67	297.55	0.7
A138	Water Street	72	73	72	73	0.60	0.89	2.75	7		19	25	4.4	0.18	0.41	0.65	200	0.48	0.013	22.72	0.72	62.5	0.03	0.30	297.52	297.22	2.9
A139	Water Street	73	74	73	74	0.32	1.21	2.75	4		11	36	4.3	0.24	0.59	0.92	200	0.41	0.013	21.00	0.67	56.1	0.05	0.23	297.17	296.94	4.4
A140	Easement	196	74	196	74	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	1.16	0.013	35.33	1.12	46.6		0.54	297.48	296.94	0.6
A141	Water Street	74	158	74	158	0.36	1.86	2.75	4		11	55	4.3	0.37	0.90	1.40	200	0.47	0.013	22.41	0.71	56.7	0.03	0.26	296.91	296.65	6.3
A142	Main Street	158	282	158	171	0.74	2.60	2.75	5		14	69	4.3	0.52	1.13	1.81	200	0.59	0.013	25.13	0.80	109.1	0.03	0.64	296.62	295.97	7.2
D1	Ausable Fields					1.04	1.04	2.10	78		164	164	4.2	0.21	2.61	3.10											
		80	78	80	78	0.40	1.44	2.75	12		33	197	4.2	0.29	3.12	3.75										297.85	
A143	Elizabeth Street	79	78	79	78	0.74	0.74	2.75	2		6	6	4.4	0.15	0.09	0.27	200	0.50	0.013	23.19	0.74	15.0		0.08	297.92	297.85	1.1
A144	Elizabeth Street	78	77	78	77	0.84	3.02	2.75	9		25	227	4.1	0.60	3.58	4.60	200	0.38	0.013	20.22	0.64	98.5	0.03	0.37	297.82	297.44	22.8
A145	Margaret Street	81	76	81	76	0.73	0.73	2.75	8		22	22	4.4	0.15	0.37	0.56	200	0.57	0.013	24.85	0.79	82.9		0.48	298.39	297.91	2.3
		272	75	272	75	0.00	0										200	1.40	0.013	38.81	1.24	44.1		0.62	298.87	298.25	0.0
A146	George Street	75	76	75	76	0.62	0.62	2.75	4		11	11	4.4	0.12	0.19	0.34	200	0.26	0.013	16.69	0.53	42.5	0.05	0.11	298.20	298.09	2.0
A147	George Street	76	77	76	77	0.52	1.87	2.75	6		17	50	4.3	0.37	0.82	1.31	200	0.43	0.013	21.41	0.68	107.9	0.28	0.46	297.81	297.35	6.1
A148	George Street	77	129	77	129	0.56	5.45	2.75	6		17	293	4.1	1.09	4.57	6.23	200	0.35	0.013	19.32	0.61	85.1	0.03	0.30	297.41	297.12	32.2
	George Street	129	296	129		0.00	5.45	2.75	0		0	293	4.1	1.09	4.57	6.23	200	0.49	0.013	23.01	0.73	85.5	0.03	0.42	-0.03	-0.45	27.1
A149	George Street	296	282		171	1.26	6.71	2.75	4		11	304	4.1	1.34	4.73	6.68	200	0.49	0.013	23.01	0.73	85.5	0.03	0.42	297.08	296.66	29.0
			37			2.89	2.89			45	131	131	4.2	0.58	2.11	2.96	200	0.31	0.013	18.14	0.58	65.3					
A150	Main Street	37	280	37	169	12.47	15.36			45	165	296	4.1	3.07	4.62	8.46	200	0.51	0.013	23.42	0.75	108.5		0.55	298.86	298.30	36.1
A151	Main Street	280	288	169		1.02	16.38	2.75	4		11	307	4.1	3.28	4.78	8.86	200	0.44	0.013	21.73	0.69	108.8	0.01	0.48	298.29	297.82	40.8
		288	281		170	0.00	16.38	2.75	0		0	307	4.1	3.28	4.78	8.86	200	0.44	0.013	21.73	0.69	108.8	0.01	0.48	297.81	297.33	40.8
A152	Main Street	281	36	170	36	2.10	18.48	2.75	8		22	329	4.1	3.70	5.11	9.68	200	0.43	0.013	21.51	0.68	107.3	0.00	0.46	297.82	297.35	45.0
A153	Main Street	36	282	36	171	1.59	20.07	2.75	4		11	340	4.1	4.01	5.27	10.21	200	0.41	0.013	21.00	0.67	108.2	0.00	0.44	297.35	296.91	48.6
A154	Stanley Street	282	30	171	30	0.36	29.74	2.75	2		6	719	3.9	5.95	10.67	18.28	200	0.46	0.013	22.24	0.71	74.1	1.03	0.34	295.88	295.54	82.2
A155	Stanley Street	30	26	30	26	0.23	133.05	2.75	1		3	5036	3.2	26.61	62.36	97.87	375	0.28	0.013	92.78	0.84	57.6	0.18	0.16	295.36	295.20	105.5
D4	280 Main St.		277			0.61	0.61	1.70	92		156	156	4.2	0.12	2.50	2.88	200	0.31	0.013	18.14	0.58	65.3					
DB	Lucan Woods		277			0.36	0.97	1.70	54		92	248	4.1	0.19	3.90	4.50	200	0.31	0.013	18.14	0.58	65.3					
A156	Butler Street	277	278	166	167	0.52	1.49	2.75	1		3	251	4.1	0.30	3.94	4.66	200	0.38	0.013	20.22	0.64	92.0		0.35	298.304712	297.95	23.1
A157	Butler Street	278	279	167	168	0.83	2.323333	2.75	3		8	259	4.1	0.46	4.06	4.98	200	0.47	0.013	22.53	0.72	93.0	0.06	0.44	297.89	297.46	22.1
A158	Butler Street	279	143	168	143	0.72	3.043333	2.75	3		8	267	4.1	0.61	4.19	5.28	200	0.37	0.013	19.95	0.64	89.3	0.02	0.33	297.43	297.10	26.4
A159	Easement	195	143	195	143	0.68	0.68	2.75	3		8	8	4.4	0.14	0.14	0.30	200	1.00	0.013	32.80	1.04	48.9		0.49	297.66	297.17	0.9

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30	units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75	units per hectare @	2.1 people/unit
High Density (Apartments)	150	units per hectare @	1.7 people/unit

Design Criteria

Residential	330	L per capita per day	Infiltration	0.2	L/s per hectare
School	140	L per student per day	Manning's n	0.013	
Commercial	45	people per hectare			
Uncertain Development Factor	1.1				

Project: 20158
Date: June 2021

Location						Area		Population					Peaking	Peak Cumulative Sewage Flow			Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A160	Butler Street	143	28	143	28	1.17	4.893333	2.75	5		14	289	4.1	0.98	4.52	6.04	200	0.47	0.013	22.49	0.72	87.2	0.02	0.41	297.08	296.67	26.9
A161	Butler Street	28	27	28	27	0.72	5.613333	2.75	3		8	298	4.1	1.12	4.64	6.34	200	0.43	0.013	21.51	0.68	84.7	0.03	0.36	296.64	296.28	29.5
A162	Butler Street	27	26	27	26	1.11	6.723333	2.75	6		17	314	4.1	1.34	4.88	6.85	200	0.38	0.013	20.22	0.64	92.7	0.02	0.35	296.25	295.90	33.9
A163	Stanley Street	26	DNE	26	190	0.46	140.24	2.75	2		6	5355	3.2	28.05	65.81	103.24	375	0.37	0.013	106.94	0.97	70.4	0.73	0.26	295.17	294.91	96.5
A164	Stanley Street	DNE	130	190	130	0.94	141.18	2.75	3		8	5364	3.2	28.24	65.90	103.55	375	0.40	0.013	110.89	1.00	82.9	0.03	0.33	294.88	294.54	93.4
D2a	Timber Ridge					1.19	1.19	2.10	89		187	187	4.2	0.24	2.97	3.53	200	0.31	0.013	18.14	0.58	65.3					
			82		82	1.30	2.49	2.75	39		107	294	4.1	0.50	4.59	5.59	200	0.31	0.013	18.14	0.58	65.3					
A165	Kent Avenue	82	3	82	3	0.99	3.48	2.75	6		17	311	4.1	0.70	4.83	6.08	200	0.31	0.013	18.14	0.58	65.3		0.20	297.45	297.25	33.5
A166	Kent Avenue	3	2	3	2	0.86	4.336667	2.75	4		11	322	4.1	0.87	4.99	6.45	200	0.29	0.013	17.72	0.56	65.1	0.01	0.19	297.24	297.05	36.4
A167	Kent Avenue	2	1	2	1	2.41	6.746667	2.75	5		14	335	4.1	1.35	5.20	7.20	200	0.63	0.013	25.99	0.83	97.1	0.07	0.61	296.98	296.37	27.7
A168	Kent Avenue	1	162	1	162	0.83	7.576667	2.75	6		17	352	4.0	1.52	5.44	7.65	200	0.25	0.013	16.53	0.53	90.7	0.03	0.23	296.34	296.11	46.3
A169	Kent Avenue	162	161	162	161	0.67	8.246667	2.75	5		14	366	4.0	1.65	5.64	8.02	250	0.25	0.013	29.73	0.61	87.6	0.63	0.22	295.48	295.26	27.0
A170	Kent Avenue	161	160	161	160	1.00	9.246667	2.75	9		25	390	4.0	1.85	6.00	8.64	250	0.25	0.013	29.73	0.61	87.8	0.01	0.22	295.25	295.03	29.1
A171	Kent Avenue	160	130	160	130	0.56	9.806667	2.75	2		6	396	4.0	1.96	6.09	8.85	250	0.25	0.013	29.73	0.61	88.2	0.06	0.22	294.97	294.75	29.8
A172	Easement	130	131	130	131	0.85	151.83	2.10	75		158	5917	3.2	30.37	71.79	112.37	375	0.22	0.013	81.30	0.74	68.3	0.24	0.15	294.51	294.36	138.2
A173	Easement	131	132	131	132	1.07	152.90	2.10	75		158	6075	3.2	30.58	73.45	114.43	375	0.35	0.013	103.43	0.94	67.1	0.03	0.23	294.33	294.10	110.6
A174	Beech Street	6	17	6	17	0.32	0.32	2.75	3		8	8	4.4	0.06	0.14	0.22	200	1.50	0.013	40.17	1.28	16.0		0.24	297.11	296.87	0.6
A175	Beech Street	16	17	16	17	1.10	1.10	2.75	6		17	17	4.4	0.22	0.28	0.55	200	1.00	0.013	32.80	1.04	77.0		0.77	297.87	297.10	1.7
A176	Gibson Crescent	17	7	17	7	0.43	1.85	2.75	6		17	41	4.3	0.37	0.68	1.16	200	0.77	0.013	28.78	0.92	64.5	0.29	0.50	296.81	296.31	4.0
A177	Gibson Crescent	7	157	7	157	0.60	2.45	2.75	8		22	63	4.3	0.49	1.04	1.68	200	0.77	0.013	28.78	0.92	64.5	0.01	0.50	296.30	295.80	5.8
A178	Gibson Crescent	157	8	157	8	0.48	2.93	2.75	6		17	80	4.3	0.59	1.30	2.08	200	0.73	0.013	28.02	0.89	52.0	0.05	0.38	295.75	295.37	7.4
A179	Gibson Crescent		9		8	0.39		1.70	150		255	255															
A179	Gibson Crescent	8	9	8	9	0.81	3.74	2.75	6		17	351	4.0	0.75	5.43	6.80	200	1.00	0.013	32.80	1.04	53.2	0.02	0.53	295.35	294.82	20.7
A180	Willow Avenue	15	14	15	14	0.62	0.62	2.75	6		17	17	4.4	0.12	0.28	0.44	200	3.89	0.013	64.69	2.06	60.4		2.35	298.93	296.58	0.7
A181	Willow Avenue	14	10	14	10	0.56	1.18	2.75	6		17	33	4.3	0.24	0.55	0.86	200	0.97	0.013	32.30	1.03	62.8	0.03	0.61	296.55	295.94	2.7
A182	Wilberforce Public School		12		12	4.12	4.12				33	33	4.3	0.82	0.54	1.50											
	Gibson Crescent	13	12	13	12	0.52	4.64	2.75	6		17	49	4.3	0.93	0.81	1.91	200	2.15	0.013	48.05	1.53	60.4		1.30	298.82	297.52	4.0
A183	Gibson Crescent	12	11	12	11	0.71	5.35	2.75	8		22	71	4.3	1.07	1.16	2.45	200	0.63	0.013	25.95	0.83	64.3	0.03	0.40	297.49	297.09	9.5
A184	Gibson Crescent	11	10	11	10	0.59	5.94	2.75	6		17	88	4.3	1.19	1.42	2.87	200	1.12	0.013	34.77	1.11	100.3	0.03	1.13	297.06	295.93	8.3
A185	Gibson Crescent	10	9	10	9	0.33	7.45	2.75	3		8	129	4.2	1.49	2.07	3.92	200	1.56	0.013	40.99	1.30	63.4	0.04	0.99	295.90	294.91	9.6
	Easement	9	32	9	32	0.00	11.19				0	480	4.0	2.24	7.30	10.49	200	0.30	0.013	17.96	0.57	45.4	0.05	0.14	294.85	294.72	58.4
	Easement	32	290	32		0.00	11.19				0	480	4.0	2.24	7.30	10.49	200	0.31	0.013	18.29	0.58	100.3	0.03	0.31	294.69	294.38	57.4
	Easement	290	132		132		11.19				0	480	4.0	2.24	7.30	10.49	200	0.31	0.013	18.29	0.58	100.3	0.03	0.31	294.35	294.03	57.4
	Easement	132	289	132	192	0.00	164.09				0	6555	3.1	32.82	78.46	122.41	375	0.37	0.013	106.94	0.97	88.7	0.31	0.33	294.07	293.74	114.5
	Easement	289	29	192	29	0.00	164.09				0	6555	3.1	32.82	78.46	122.41	375	0.25	0.013	88.02	0.80	75.3	0.18	0.19	293.56	293.37	139.1
A186	Chestnut Street	194	193	194	193	1.18	1.18	2.75	3		8	8	4.4	0.24	0.14	0.41	200	1.42	0.013	39.08	1.24	74.8		1.06	297.03	295.97	1.1
A187	Walnut Street	193	265	193	265	0.11	1.29				0	8	4.4	0.26	0.14	0.44	200	1.27	0.013	36.96	1.18	57.0	0.075	0.72	295.89	295.17	1.2
A188	Walnut Street	260	261	260	261	0.94	0.94	2.75	9		25	25	4.4	0.19	0.41	0.66	200	0.40	0.013	20.74	0.66	74.9		0.30	295.46	295.16	3.2
A189	Walnut Street	261	265	261	265	0.70	1.64	2.75	8		22	47	4.3	0.33	0.77	1.21	200	0.40	0.013	20.74	0.66	74.8	0.03	0.30	295.14	294.84	5.8
A190	Walnut Grove Place	265	264	265	264	0.26	3.19	2.75	3		8	63	4.3	0.64	1.04	1.84	200	0.40	0.013	20.74	0.66	51.6	0.08	0.21	294.76	294.56	8.9
A191	Walnut Grove Place	264	263	264	263	0.33	3.52	2.75	4		11	74	4.3	0.70	1.21	2.11	200	0.40	0.013	20.74	0.66	48.4	0.07	0.19	294.48	294.29	10.2
A192	Walnut Street	260	255	260	255	0.86	0.86	2.75	9		25	25	4.4	0.17	0.41	0.64	200	0.43	0.013	21.51	0.68	75.3		0.32	295.68	295.36	3.0
A193	Walnut Street	254	255	254	255	0.29	1.15	2.75	2		6	30	4.4	0.23	0.50	0.81	200	0.61	0.013	25.62	0.82	23.3		0.14	295.51	295.36	3.1
	Easement	255	258	255	258	0.00	2.01				0	55	4.3	0.40	0.90	1.44	200	0.52	0.013	23.65	0.75	100	0.08	0.52	295.29	294.77	6.1
A194	Walnut Grove Place	256	257	256	257	0.29	0.29	2.75	3		8	8	4.4	0.06	0.14	0.22	200	0.61	0.013	25.62	0.82	26.7		0.16	295.01	294.85	0.8
A195	Walnut Grove Place	257	258	257	258	0.31	0.6	2.75	4		11	19	4.4	0.12	0.32	0.49	200	0.52	0.013	23.65	0.75	28.0	0.05	0.15	294.80	294.65	2.1
A196	Walnut Grove Place	258	259	258	259	0.70	3.31	2.75	9		25	99	4.2	0.66	1.61	2.49	200	0.40	0.013	20.74	0.66	66.2	0.03	0.26	294.63	294.36	12.0
A197	Walnut Grove Place	259	262	259	262	0.87	4.18	2.75	12		33	132	4.2	0.84	2.12	3.25	200	0.40	0.013	20.74	0.66	82.5	0.03	0.33	294.34	294.01	15.7
A198	Walnut Grove Place	262	263	262	263	0.80	4.98	2.75	10		28	160	4.2	1.00	2.55	3.90	200	0.40	0.013	20.74	0.66	76.3	0.03	0.31	293.98	293.68	18.8
	Easement	263	266	263	266	0.00	8.50				0	234	4.1	1.70	3.68	5.92	200	0.40	0.013	20.74	0.66	70.7	0.05	0.28	293.63	293.35	28.5
	Easement	266	29	266	29	0.00	8.50				0	234	4.1	1.70	3.68	5.92	200	0.40	0.013	20.74	0.66	16.1	0.08	0.06	293.26	293.20	28.5
	Easement	29	CPS	29	CPS	0.00	172.59					6788	3.1	34.52	80.88	126.94											

SANITARY SEWAGE COLLECTION SYSTEM WORKSHEET - COMMUNITY OF LUCAN
TOWNSHIP OF LUCAN BIDDULPH

Residential Population Densities

Low Density (Single-Family)	30	units per hectare @	2.75 people/unit
Medium Density (Townhouse/Rowhouse)	75	units per hectare @	2.1 people/unit
High Density (Apartments)	150	units per hectare @	1.7 people/unit

Design Criteria

Residential	330	L per capita per day	Infiltration	0.2	L/s per hectare
School	140	L per student per day	Manning's n	0.013	
Commercial	45	people per hectare			
Uncertain Development Factor	1.1				

Project: 20158
Date: June 2021

Location						Area		Population					Peak Cumulative Sewage Flow				Sewer Design						Profile				
Area No.	Street	GIS From Manhole	GIS To Manhole	Dillion From Manhole	DillionTo Manhole	Delta Hectares	Total Hectares	Per Lot	No. of Lots	Per Hectare	Delta Population	Total Population	Peaking Factor	Infiltration (L/s)	Sewage (L/s)	Total Flow (L/s)	Pipe Size (mm)	Slope (%)	Manning's n	Capacity (L/s)	Velocity (m/sec)	Length (m)	Drop in MH (m)	Fall in Sewer (m)	Invert Elevation (m) U.S.	Invert Elevation (m) D.S.	Percent Full (%)
A19	Street B					0.75	0.75	2.10	50		105	176															
A20	Street B					1.24	1.99	2.75	43		118	295															
A18	Street B	AH	AG	RC21	RC20	0.59	2.58	2.75	12		33	328	4.1	0.52	5.08	6.16	200	0.60	0.013	25.41	0.81	103.0	0.03	0.62	300.655	299.745	24.2
A23	Street B	AG	AF	RC20	RC19	0.43	3.01	2.10	25		53	380	4.0	0.60	5.86	7.10	200	0.50	0.013	23.19	0.74	20.8	0.03	0.10	299.695	299.383	30.6
A24	Street B	AF	S	RC19	RC3	0.39	3.40	2.75	8		22	402	4.0	0.68	6.18	7.54	200	0.40	0.013	20.74	0.66	72.3	0.05	0.29	299.333	298.249	36.4
D2b	Timber Ridge					1.19		2.10	89		187	187	4.2	0.00	2.97	3.27	200	0.31	0.013	18.14	0.58	65.3					
			V			1.30		2.75	39		107	294	4.1	0.00	4.59	5.04	200	0.31	0.013	18.14	0.58	65.3					
A1	Street A	V	U	RC1	RC2	0.75	0.75	2.75	17		47	341	4.1	0.15	5.28	5.97	200	0.60	0.013	25.41	0.81	80.4	0.03	0.48	300.493	299.769	23.5
A1a	Street A	U	T	RC2	RC2a	0.77	1.52	2.75	12		33	374	4.0	0.30	5.76	6.67	200	0.50	0.013	23.19	0.74	80.4	0.03	0.40	299.719	298.995	28.8
A2	Street A	T	S	RC2a	RC3	0.66	2.18	2.75	14		39	412	4.0	0.44	6.33	7.44	200	0.50	0.013	23.19	0.74	80.4	0.03	0.40	298.895	298.222	32.1
A3	Street A	S	R	RC3	RC4	0.49	6.07	2.75	6		17	831	3.9	1.21	12.22	14.78	200	0.40	0.013	20.74	0.66	72.3	0.05	0.29	298.172	297.525	71.2
A31	Beech Street	AE	AD	RC29	RC31	0.66	0.66	2.75	12		33	33	4.3	0.13	0.55	0.75	200	0.45	0.013	22.00	0.70	73.8	0.03	0.33	300.311	299.979	3.4
A32	Beech Street	AD	R	RC31	RC4	0.67	1.33	2.75	12		33	66	4.3	0.27	1.08	1.48	200	2.99	0.013	56.71	1.81	78.5	0.05	2.35	299.879	297.530	2.6
A4a	Street A	R	Q	RC4	RC5	0.46	7.86	2.75	7		19	916	3.8	1.57	13.38	16.45	200	0.56	0.013	24.54	0.78	89.8	0.03	0.50	297.425	296.905	67.0
A25	Street C/F	AC	AB	RC23	RC24	0.77	0.77	2.75	7		19	19	4.4	0.15	0.32	0.52	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	298.704	298.574	2.4
A26	Street C/F	AB	Z	RC24	RC25	0.85	1.62	2.75	10		28	47	4.3	0.32	0.77	1.21	200	0.45	0.013	22.00	0.70	91.7	0.05	0.41	298.524	298.111	5.5
A27	Street C/F	Z	Y	RC25	RC26	0.47	2.09	2.75	4		11	58	4.3	0.42	0.95	1.50	200	0.45	0.013	22.00	0.70	15.0	0.05	0.07	298.061	297.994	6.8
A28	Street C/F	Y	X	RC26	RC27	0.74	2.83	2.75	9		25	83	4.3	0.57	1.34	2.10	200	0.40	0.013	20.74	0.66	101.7	0.05	0.41	297.944	297.537	10.1
A29	Street C/F	X	W	RC27	RC28	0.42	3.25	2.75	4		11	94	4.3	0.65	1.52	2.39	200	0.40	0.013	20.74	0.66	20.8	0.05	0.08	297.487	297.404	11.5
A30	Street C/F	W	Q	RC28	RC5	0.71	3.96	2.75	10		28	121	4.2	0.79	1.95	3.02	200	0.51	0.013	23.42	0.75	85.5	0.05	0.44	297.354	296.905	12.9
A5	Street A	Q	P	RC5	RC6	0.77	12.59	2.75	12		33	1070	3.8	2.52	15.46	19.77	200	0.40	0.013	20.74	0.66	101.3	0.05	0.41	296.880	296.475	95.3
A6	Street A	P	O	RC6	RCCAP	0.91	13.50	2.75	14		39	1109	3.8	2.70	15.97	20.54	200	1.81	0.013	44.13	1.40	99.4	0.05	1.80	296.435	294.636	46.5
A6	Street A	O	B	RCCAP	RC7	0.00	13.50	2.75	0		0	1109	3.8	2.70	15.97	20.54	200	0.40	0.013	20.74	0.66	21.4	0.05	0.09	294.636	294.550	99.0
A7	Street E	A	B	RC18	RC7	0.26	0.26	2.75	4		11	11	4.4	0.05	0.19	0.26	200	0.60	0.013	25.41	0.81	43.1	0.05	0.26	294.893	294.635	1.0
A8	Street E	B	C	RC7	RC9	0.57	14.33	2.75	10		28	1147	3.8	2.87	16.48	21.28	200	0.68	0.013	27.05	0.86	86.3	0.05	0.59	294.610	294.160	78.7
A9	Street E	C	D	RC9	RC10	0.65	14.98	2.75	12		33	1180	3.8	3.00	16.92	21.90	200	0.64	0.013	26.24	0.84	71.9	0.05	0.46	294.110	293.650	83.5
A10	Street E	D	E	RC10	RC11	0.29	15.27	2.75	1		3	1183	3.8	3.05	16.95	22.01	200	0.64	0.013	26.24	0.84	40.5	0.05	0.26	293.600	293.340	83.9
		E	F																								
A11	Street E	F	G	RC11	RC12	0.20	15.47	2.75	1		3	1186	3.8	3.09	16.99	22.09	200	0.57	0.013	24.76	0.79	28.1	0.05	0.16	293.310	293.150	89.2
A12	Street E	G	H	RC12	RC40	0.05	15.52	2.75	0		0	1186	3.8	3.10	16.99	22.10	200	0.62	0.013	25.83	0.82	36.3	0.05	0.23	293.070	292.924	85.6
A13	Walnut Street	193	M	RC39	RC17	0.12	0.12	2.75	0		0	0	4.5	0.02	0.00	0.03	200	0.40	0.013	20.74	0.66	30.0	0.05	0.12	296.631	296.511	0.1
A14	Walnut Street	N	M	RC30	RC17	0.16	0.16	2.75	6		17	17	4.4	0.03	0.28	0.34	200	0.35	0.013	19.40	0.62	104.9	0.05	0.37	296.907	296.540	1.8
A15	Street E	M	L	RC17	RC16	0.55	0.83	2.75	6		17	33	4.3	0.17	0.55	0.79	200	2.52	0.013	52.07	1.66	29.0	0.05	0.73	296.443	294.950	1.5
A16	Street E	L	K	RC16	RC15	0.50	1.33	2.75	6		17	50	4.3	0.27	0.82	1.19	200	0.60	0.013	25.41	0.81	29.0	0.05	0.17	294.868	294.508	4.7
A17	Street E	K	H	RC15	RC40	0.06	1.39	2.75	0		0	50	4.3	0.28	0.82	1.20	200	0.61	0.013	25.62	0.82	29.0	0.05	0.18	294.464	294.244	4.7
	Street E	H	I	RC40	RC41	0.00	16.91	2.75	0		0	1076	3.8	3.38	15.53	20.81	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.895	292.844	94.6
	Street E	I	J	RC41	RC38	0.00	16.91	2.75	0		0	1076	3.8	3.38	15.53	20.81	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.791	292.761	94.6
	Street E	J		RC38	RCPS	0.00	150.76	2.75	0		0	3368	3.4	30.15	43.73	81.27	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	292.125	292.115	369.4
A4b	Beech Street		R	RCSTUB	RC4	0.09	0.09	2.75	0		0	0	4.5	0.02	0.00	0.02	200	0.45	0.013	22.00	0.70	29.0	0.05	0.13	297.620	297.530	0.1
	Walnut Grove	Force Main	J	MH 2 EX	RC38	6.41	6.41					192															
	Town of Lucan		J		RC38	110.00	116.41					2100															

Appendix E

Lucan Two Zone Flood Policy (1993)

AUSABLE BAYFIELD CONSERVATION AUTHORITY

TWO ZONE POLICY FOR THE VILLAGE OF LUCAN
(Benn and Whitfield Drains)

The Two Zone Policy is based on the general provisions for Two Zone Floodplain Management as set out in policies by the Province of Ontario and the ABCA.

Reach Definition: The Benn and Whitfield Drains within the boundaries of the Village of Lucan.

Supporting Technical Reports:

- Urban Floodplain Delineation - Lucan, Crediton, and Grand Bend. Proctor & Redfern Limited, 1984.
- Lucan Benn Drain Hydraulic Update. Procter & Redfern Limited, 1988.
- Lucan Two Zone Study B. M. Ross and Associates Limited, 1993.

Municipality Affected and Date of Formal Approval

Village of Lucan December 7, 1993

Definitions:

Regional Flood Level - Fully developed state regional flood levels as per 1993 B. M. Ross and Associates Limited Report

One Hundred Year Flood Level - Fully developed state one hundred year flood level as per 1993 B. M. Ross and Associates Limited Report

Floodway - Hydraulic floodway as determined from channel capacity and floodwater storage requirements. Where no specific floodway has been delineated, optimum floodway width is considered to be 40 metres. A minimum value of 30 metres may be considered where a detailed hydraulic analysis shows that the encroachment will not impact the general floodplain continuity and the development proposal meets the Authority policies regarding floodplain development.

Flood Fringe - Floodplain area between the designated floodway and the limit of the regional storm floodplain.

Dry Passive Floodproofing - The use of techniques, such as the following examples, in such a manner that they are permanently in place and do not require advance warning or action in order to eliminate flood damages at the Regional Flood levels.

- The use of fill or design modifications to elevate building or structure openings above the Regional Flood level.

- The use of seals, berms or floodwalls to prevent water from entering openings below the Regional Flood level.

Development Criteria

Extent of floodway and flood fringe areas is defined on Map 1 of the B. M. Ross and Associates Limited Report. For the purposes of the Two-Zone Policy, the Regulatory Flood Datum for flood proofing considerations will be in accordance with elevations provided in Table 5.1 of the B. M. Ross and Associates Limited Report.

Development Constraints for Floodway Areas

* No new development
* No filling
* Essential municipal services only
* Expansions to existing buildings will be considered based upon existing Authority flood plain policies subject to an individual site assessment of the expansion impacts on the floodway hydraulics
* Fencing may be permitted in backwater area
* New roadways crossing the areas must have a minimum elevation of 0.3 metres less than the Regional Storm Flood Elevation and not restrict or reduce the flow characteristics of the Benn or Whitfield Drains.

Development Constraints for Flood Fringe Areas

New development permitted provided that dry passive flood proofing to the elevation of the Regulatory Flood datum is undertaken.

1. Minimum lot grading elevation for building envelopes will be 0.3 metres below Regulatory flood elevations.

2. Minimum opening elevations to living space must be above the Regulatory Flood Datum except in the Whitfield Drain spill area between Duchess Avenue and Alice Street west of Maple Street where the minimum opening elevation to living space to be a minimum of .3 metres above street centreline elevation.

3. Basements are not recommended, however, if basements are proposed at elevations lower than allowed by Ausable Bayfield Conservation Authority policies:

   * poured concrete foundations-maximum 0.9 metres below the Regulatory Flood Datum.

   * concrete block foundations-maximum 0.8 metres below the Regulatory Flood Datum.

   then the foundation walls and basement floor slab shall be designed by a Professional Engineer, taking into consideration the stability of the underlying soils (or fill material) and flooding effects.

4. Where foundations will be placed on fill material, the foundation shall be designed by a Professional Engineer, taking into consideration the stability of fill material and flooding effects.

5. New development and filling activities must ensure that lot grading and drainage does not adversely affect adjacent properties.

6. Major development proposals will require a Storm Water Management Plan.

7. At the earliest opportunity in the normal planning review process, the Village of Lucan will:

   * Include policies in its official plan that explain the intent of the Two Zone concept and development potential of the flood fringe versus floodway.

   * Zone the flood fringe and floodway in conformity with official plan designation, recognizing the flood hazard and flood proofing requirements for the flood fringe and the prohibited uses in the floodway.

NOTE: REFER TO LUCAN FLOOD PLAIN MAPPING AND TABLE 6- OF LUCAN TWO ZONE STUDY REPORT FOR DETAILED FLOODLINE INFORMATION
AUSABLE-BAYFIELD CONSERVATION AUTHORITY
LUCAN TWO ZONE POLICY MAP
BENN AND WHITFIELD DRAINS
LEGEND
Regulatory Flood elevation
Section number
100 year flood elevation
NORTH
SCALE 1:2500
METRES 40 0 100 200 METRES
FEET 100 0 100 200 300 400 500 600 700 800 FEET
NOTE: DIGITAL MAPPING BASE PROVIDED BY LAND AND RESOURCES BRANCH, MINISTRY OF NATURAL RESOURCES. MAPPING IS BASED ON 1:20,000, 1991 AIR PHOTOGRAPHY, PUBLISHED IN 1992.
B.M.ROSS AND ASSOCIATES LIMITED
CONSULTING ENGINEERS
GODERICH, MOUNT FOREST ONTARIO
VILLAGE OF LUCAN
FLOODLINES AND
TWO ZONE POLICY AREAS
DATE: SEPT. 1993
PROJECT NO.
93057
MAP 1

Appendix F

ABCA Guidelines for Locating SWMFs within Riverine Floodplains

Table 3.2: SWM Facilities within Riverine Flooding Hazards – Considerations and Design Guidelines

Natural Hazard Consideration	Design Guidelines
Flooding	
Flood Elevations	No significant increases or decreases in upstream or downstream flood levels
Flood Conveyance	Facility must be located outside of the 100-year floodplain or hydraulic floodway, whichever is greater.
	No significant change in cross sectional, incremental flood plain flow and velocity distribution. Hydraulic modeling analysis illustrating the above, completed to the satisfaction of the Authority, will be required.
Flood Storage	No significant change or loss of flood plain storage based on cumulative analysis of future potential SWM facilities in a planning reach of the watercourse (remedial or new).
	Basins should be primarily excavated with a balance of cut and fill provided at corresponding flood stage. Maximum berm heights above existing grades should be no higher than 0.3 m.
	Storage volumes within the pond are considered to be non-available in calculations since they are designed to be occupied by water.
Erosion and Sedimentation	
Erosion	Facility should not be susceptible to scour and erosion associated with the watercourse, and will not significantly increase upstream and downstream flood plain scour and deposition
	Will not increase susceptibility of long term natural stability of soils and slopes. Provincially established setback policy applies in areas of steep or eroding watercourse bank slopes
	Erosion hazards are not further aggravated or new hazards created (through development of the facility and access to the facility)
Sedimentation	Not significantly susceptible to increases in flood plain sediment deposition, erosion, and delivery processes
Stream Morphology	Construction of the facility should have no hydraulic impact on the watercourse, and must not affect fluvial processes in the floodplain. Fluvial processes would include allowance for the long-term adjustment of the stream channel (morphology changes over 100 years). The facility must also not affect the floodplain forming processes caused by extreme events.
Ecological Resource Factors	
Groundwater	No change in seasonal high groundwater levels
	Not located in groundwater discharge area
	Pond leakage during treatment through the typically coarser flood plain soils should be minimized through lining as required. In other words, a wet facility must be constructed so as to ensure that a permanent pool will not be affected by infiltration.
	Enhancement of groundwater and uses
Aquatics	Minimum stream setbacks of 30 m are required for stream habitat unless an Environmental Impact Study (EIS) can be prepared and approved to support a reduced buffer.
	Surface water linkage
	Integration of use between aquatics and SWM treatment
Natural Heritage	Fits with local natural heritage strategy/plan (catchment, Subwatershed basis)
	Restores or enhances existing site conditions relevant to natural heritage attributes and functions
	Type of treatment facility (required to meet natural heritage objectives)
	Impact of solids on water quality (care and control of contaminants)
Other Factors	
Planning	Most effective treatment as preferred alternative determined through catchment planning, compensation assessment for other equitable treatments/ restoration (not maintenance), remedial treatment for existing development
Performance	Will meet design and maintenance performance requirements for the watercourse. Provision should be made for maintenance activities including access and cleanout. Temporary storage location should be provided for dredging of accumulated material to allow for drainage prior to transportation.
	Will account for backwater conditions at outlet, complexity of outlet rating
	Type of facility (dry vs. wet)
	Maintainable to design intent or standards
	Contingency provided

Appendix G

Consultation Materials