REPORT

Irongate Industrial Plan Change
Water Services Assessment

Prepared for Hastings District Council

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QUALITY ASSURANCE STATEMENT

PROJECT MANAGER	REVIEWED BY
Tim Grace	David Yorke, Tim Grace, Karen Kiriona
PREPARED BY	**APPROVED FOR ISSUE BY**
Wayne Hodson	Tim Grace

HAWKES BAY
1st Floor, 100 Warren Street South, PO Box 1190, Hastings 4156, New Zealand
P + 64-6-873 8900, F + 64-6-873 8901

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HASTINGS DISTRICT COUNCIL

Irongate Industrial Plan Change
Water Services Assessment

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1 Introduction

MWH has been engaged by the Hastings District Council to carry out an assessment of the water services infrastructure required to service a potential industrial development at the area known as the "Irongate Cluster". This is an area approximately 1km to the southeast of Flaxmere and 1km southwest of Hastings.

There is existing industrial type development in this area that is not currently serviced by the Council, apart from a wastewater service servicing only the Farmers Transport site. This consists of a private rising main along Maraekakaho Road that connects into the Council gravity wastewater network near Oliphant Road.

This assessment follows on and collates the findings from previous assessments carried out by MWH considering various development scenarios, including the following reports:

- MWH, *Irongate Zone – Revised Structure Plan Assessment – Industrial Expansion Project*, Draft October 2006.
- MWH, *Irongate Development, Water Services Assessment,* Revised Report – Draft 13 June 2008.

This report details the findings of the previous assessments along with clarification of design standards and details from further investigations and assessments. The main focus of the final reporting is in regard to servicing the development for water and wastewater services.

Stormwater options are addressed in detail in a separate report prepared by MWH.

The water services assessment has been undertaken at a high level to support the plan change being developed for the area, and is subject to confirmation with further investigation, survey and detailed design after the plan change has been approved and the required infrastructure works are to be implemented.

2 Background

2.1 General

The Strategic Development Group of the Hastings District Council (the Council) is currently preparing a plan change to rezone land in the "Irongate Cluster" area for industrial purposes. In order to support the proposed plan change the Council requires an assessment of the water services associated with the future subdivision and industrial development of the area. The proposed plan change stems from the Council's broader industrial review which commenced early in 2000.

In September 2003 the Council adopted the recommendations of the *Industrial Site Selection Report*[1] and endorsed the associated strategy. The areas identified as being most suitable for industrial rezoning were the Omahu Road Strip (for high profile dry industry uses), the Irongate Cluster (for larger scale dry industry uses) and the Tomoana Extension (for wet industry uses that require access to the trade waste sewer).

As part of the 2006 Long Term Council Community Plan (LTCCP) process the Council decided to defer any infrastructure construction and hence the rezoning of the Tomoana Extension area until after 2016 due to the existing capacity for wet industry in the current Whakatu industrial zone. The subsequent investigations have therefore focused on the Omahu Road Strip and Irongate Cluster areas.

The Council has now decided to move forward with the notification of a plan change for the Irongate Cluster area and requires area specific assessments to be completed on the basis of the most recent decisions in relation to the extent of the proposed new industrial area.

The proposed extent of area to be rezoned, in stages, is bounded to the west by the proposed NZTA expressway southern extension. The area includes some existing Industrial 6 zoned land, which is a spot industrial zone in the District Plan, and also properties with resource consents allowing industrial type activities.

2.2 Previous Reports

Summary details from the previous assessment and reports are noted below as background information.

2.2.1 Irongate Zone Revised Structure Plan Assessment – October 2006

This assessment was based on a total development area of 50ha (only part of the current proposed stage 1 area). Summary points from the report are listed below.

Water Supply

- Principal water supply challenge in servicing the Irongate development is determining the appropriate level of fire-fighting water supply to be provided.
- Potentially a high fire hazard category applies (W7 under the 2003 fire fighting water supply code) to the expected industries within the Irongate development area that would be unrealistic to be met from a mains supply. Supplementary fire water supply from bores and the stream was recommended.
- Recommended that developers/building owners be required to provide their own solution to meet higher standards (design for smaller fire cells, additional on-site water storage, sprinkler provision or additional water source).

[1] Industrial Site Selection Report, Hastings District, M Anner and A Summerfield, Strategic Planners, Hastings District Council

- Water supply for consumptive demand of 0.5 l/s/ha as per the Hastings District Council Engineering Code of Practice (ECOP) for light water use industry. No significant process water to be provided and each connection will be approximately 25mm internal diameter.

Wastewater

- Domestic wastewater reticulation system for peak flows of up to 0.5 l/s/ha for light water use category in the ECOP. Type of industry expected would potentially have water use less than this with small quantities of process and cleaning water and low numbers of employees.
- A range of solutions were assessed, including on-site treatment and disposal, with the outcome that provision of a fully reticulated gravity sewer system along the road boundaries would provide the greatest flexibility and long term security of service with the uncertainty in demand.
- Pump stations would be required.

Stormwater

- Feasible for the majority of stormwater from the development to be disposed to ground soakage within lot boundaries.
- Stormwater from yard areas with potential sediment and non-toxic organic contamination to be treated by on-site detention treatment. Other contaminated stormwater to wastewater system with controls on flow rate and volume. Stormwater from roof areas with appropriate paint and roof claddings assumed no treatment required.
- Stormwater from roads to grass swales and shallow detention with ground soakage.
- With on-lot ground soakage the impacts on the capacity of the Irongate Stream considered negligible with no specific mitigation measures required.

2.2.2 Irongate Development – Water Services Assessment – Draft June 2008

Following the assessment completed in 2006, further assessment was carried out in late 2007 through to June 2008. This was for a total development area of up to 115ha. A number of development scenarios were assessed considering different combinations and staging of various areas ranging from 76ha to 115ha. The assessment included the required infrastructure and associated rough order cost estimates. Some of the key conclusions and recommendations from this assessment were:

- Servicing of the Irongate industrial area (water and wastewater) appears feasible.
- Significant expenditure required on extensions or upgrades of existing water and wastewater networks.
- There is some level of uncertainty as to the actual water and wastewater demands from the expected "light" industrial development.
- Parts of the development area more expensive to service than others.
- Further assessment needs to be carried out to determine the feasibility of on-site stormwater disposal for the development.
- Further discussion/liaison with the New Zealand Fire Service needs to be carried out to confirm or otherwise the proposed fire-fighting water supply capacity for the development.

2.3 Infrastructure Workshop

A workshop was held with Council and MWH staff on the 1st October 2008 to confirm various aspects of the infrastructure for the development. Summary details of outcomes from this workshop are:

Water

- Water supply to the development limited to 0.5 l/s/ha.
- Water for the development to be sourced from an upgrade of the existing site on Wilson Road in Flaxmere.
- Fire-fighting water supply to be provided, but quantity to be confirmed.

Wastewater

- Wastewater discharged from the development to be limited to 0.5 l/s/ha, for light industry with domestic sanitary sewage.
- No facility for separate trade waste to be provided.
- Conventional sewerage system will require a number of pump stations.
- Pressure sewerage system to be considered as an option.
- Twin rising main to be provided from the development to connect into the existing western interceptor sewer (intersection of Pepper Street and Francis Hicks Avenue). This connection point is where adequate capacity exists for the full development. The twin rising main is to provide flexibility in managing wastewater flows from the development as it progresses and the wastewater flows increase over time. Initially wastewater flows would be limited and would be easier to manage with a smaller diameter main. The additional main would provide adequate capacity for the ultimate development.

Stormwater

- Stormwater to be addressed "on-site" within each property.
- A feasibility study for on-site stormwater required to confirm or otherwise the proposed approach.
- Hydraulic neutrality desired by the Hawke's Bay Regional Council due to downstream capacity problems.
- Ongoing management and maintenance of on-site systems could be problematic.

3 Levels of Service and Design Demands

3.1 Introduction

The demand for water services from the industrial development that may occur in the Irongate industrial area is not certain. However, it is expected that the majority of demand would be from domestic type needs, relating mainly to the number of staff working at individual premises. The nature of the "light industrial" type of development is that there would not be any significant process or irrigation water requirements, limiting the overall water demand. However, the type of industry and water demand would still need to be controlled with an agreed "level of service" established.

The level of service describes what the user can expect from the service. This includes the quantity or limits that will be placed on the service, i.e. for water supply the volume and rate at which water would be supplied to a particular property (Refer to Section 3.2 below for methods to restrict industrial water use).

The following sections (Sections 4 to 6) detail the constraints and relevant guidelines regarding establishing the level of service for the various water service components and establishing the total design demands for servicing the development.

3.2 Summary of Levels of Service

The proposed level of service for water services to the development are summarised as:

Fire Fighting Water Supply – Minimum of FW4 (100 l/s) under the SNZ PAS 4509:2008 *New Zealand Fire Service Fire fighting Water Supplies Code of Practice.*

Water and Wastewater – Peak flow of 0.5 l/s/ha (*i.e. for 1 ha lot maximum flow of 0.5 l/s or for 10 ha lot a maximum flow of 5 l/s*).

Further detail is provided in the following sections (sections 4 to 6) as to the reasoning and basis for setting these levels of service.

3.3 Methods to Restrict Industrial Use

The following sections (sections 4 to 6) include details of the proposed levels of service. These will be controlled in the development by the following mechanisms:

- Water services bylaw and the need for individual consents for wastewater discharge for each industrial property that would limit the volume and rate of discharge from individual properties.
- Building Act with regard to fire-fighting water supply and building design for fire that may require individual properties to provide additional fire-fighting water supply over that which is available.

4 Fire Fighting Water Supply

4.1 Level of Service and Design Demands

The relevant documents considered for the level of service or expected demand are:

1. SNZ PAS 4509:2008 *New Zealand Fire Service Fire Fighting Water Supplies Code of Practice.*
2. Hastings District Council: Engineering Code of Practice, Part 2: Engineering Standards, Water Supply, November 1997.
3. Previous assessment reports

Requirements from each of the above documents are detailed below. In addition details from discussions with the New Zealand Fire Service (NZFS) are also noted.

SNZ PAS 4509:2008

The code of practice notes a water supply classification (FW1 to FW7) which can be assessed based on the fire hazard category for the building, floor area of building or size of the largest firecell and whether it has sprinklers or not. The fire hazard category is defined in the compliance documents for the New Zealand Building Code, Acceptable Solution C/AS1. In summary the fire hazard category ranges from FHC 1 for motels, hotels and hostels of less than 100 people to FHC 4 for working/business/storage activities with high fire load, supermarkets, feed mills or other stores with bulk display over 3 metres high.

Alternative methods can be used by Fire Engineers or other competent persons to determine fire fighting water supply requirements for buildings, but these have not been considered as part of this assessment. It is noted that the code requires these "alternative" methods be used for the FW7 water supply classification. The FW7 is for either special or isolated hazards or where the fire hazard category and size of the largest firecell make specific fire engineering assessment necessary.

Water supply classification for buildings in the development would be in the range of:

(a) FW2 for sprinklered structures
(b) FW3 to FW7 for non-sprinklered structures.

A fire fighting water supply capable of providing between 25 l/s (FW2) and 200 l/s + (FW7) to service the development is required, depending on the water supply classification to be provided for.

Hastings District Council Engineering Code of Practice (ECOP)

The current ECOP (1997) refers to the old code of practice for fire fighting water supplies (1992). The ECOP details that "selected industrial areas" are risk class C, with flow of 100 l/s required. "Other industrial areas" are noted as risk class D, with a flow of 50 l/s required.

Previous Assessment Reports

The earlier assessments were based on the 2003 fire fighting code of practice, which had different water supply classifications to the current code. The assumption was made in the earlier assessments that the fire-fighting water supply be limited to a W4 classification (under 2003 code), which requires 50 l/s fire flow from up to 3 hydrants. The earlier assessment assumed that supplementary water could be provided where necessary for development areas with a greater fire hazard category and water supply classification.

New Zealand Fire Service (Eastern Fire Region)

Initial discussions were held with the New Zealand Fire Service (Eastern Fire Region) in June 2008 in regards to the reticulated water supply required for the development. This identified the expectations that the New Zealand Fire Service had with regard to potential fire hazards and fire fighting water supply requirements for the plan change area. These aspects have been taken into consideration as part of determining the appropriate level of service for the fire fighting water supply.

Based on the above Code of Practice and assessment of likely requirements it is recommended that the absolute minimum standard of fire-fighting water supply to be provided to the development is FW4 (100 l/s). FW4 requires 50 l/s within 135m and additional 50 l/s within 270m of the fire hazard, from a maximum of 4 hydrants. This would be adequate for non-sprinklered buildings or firecell sizes up to 400m^2 for FHC 3. Greater fire hazards would require supplementary fire-fighting water supplies.

A higher level of service for fire-fighting may be appropriate if it is likely that a significant proportion of the development would fall into a higher fire hazard category, with an associated higher level of fire-fighting water supply required. However, based on what is known at this stage, this does not appear to be the case.

4.2 Infrastructure Requirements

The fire flow assessment and pipe sizes are based on providing the required fire fighting water capacity, as noted above, to the extremities of the development area. The drawing contained in Appendix A provides details of the required pipe sizes. These pipe sizes are based on preliminary design assessment. In summary a 300mm diameter main from Flaxmere to the Irongate development is required to deliver an FW4 standard.

To provide the capacity required, the size of the water mains to be installed has increased beyond that earlier assessed, especially at the extremities of the development area.

In addition to the supply main, the minimum size for rider water mains of 150mm diameter is included to provide adequate capacity to both sides of the road reserve and meet the hydrant spacing requirements. An allowance for hydrants on both sides of the road at a spacing of 100m is included.

The infrastructure provided by Council will be only within existing road reserves, with no pipe network provided into the existing private land (Refer to the drawing in Appendix A). This effectively means that only land developed within an offset of approximately 130m (potentially less depending on water main and hydrant location) from the existing road reserve would be serviced. Land developed beyond that would require extension of the water mains into the development areas to meet the hydrant spacing required by the fire fighting code of practice. In some areas it may be advantageous to provide public water mains along service corridors, especially where there are a number of smaller size lots remote from existing road reserves. It is expected that where any additional water mains are provided that they would be funded by the developer, not Council. However, these additional water mains may in some cases be vested in Council. Section 8 following provides further details on provision of service corridors.

5 Water Supply

5.1 Level of Service and Design Demands

The ECOP notes that the design demand for industrial areas shall be on an as required basis for the specific users to be served for both quantity and pressure.

Under the Hastings District Council Water Services Bylaw 2009, water supply to properties in the industrial area would be classed as an extraordinary supply and may be subject to specific conditions and limitations set by the Council in a consent or agreement under the Bylaw.

Previous reports have noted that water supply to the Irongate industrial development would be limited to a peak flow 0.5 l/s/ha. This is on the basis of the water demand expected for light industrial development.

The recommended level of service for the development is on the basis of a peak water supply capacity of 0.5 litres per second per hectare (l/s/ha), i.e. peak supply of 0.5 l/s for a 1 ha lot, or 5 l/s for a 10ha lot. Should an individual development require a greater water supply capacity then this could be provided by the individual property concerned having one or more of the following:

- On-site storage to provide for higher peak flows.
- Additional on-site water source to provide a greater average flow rate.
- Individual level of service agreement.

There would be an increase in cost to provide water supply infrastructure for a level of service greater than the expected light industrial development, especially if it was increased to service wet industries with significant process water requirements. It is anticipated that providing a greater level of service would only be beneficial to a few in the future given the type of development that is expected to occur in the new industrial area. It would also not be consistent with Council's intentions for "dry" type industrial use within the development, with no separate trade waste sewer provided.

The design allowance is expected to be more than adequate to cater for actual water requirements from the overall ultimate development.

Total water supply requirements, including for fire fighting are summarised as:

- Peak water demand, consumption only of 58 l/s (115ha total area);
- Average water demand of 24 l/s (2070 m^3/day) based on a peaking factor of 2; and
- Peak demand including fire fighting of 135 l/s (60% of 58 l/s for consumptive demand and 100 l/s for fire-fighting).

5.2 Water Source

The proposed water source for the industrial area is from the existing Wilson Road water supply source in Flaxmere. The proposed new industrial area will require additional water capacity beyond that available from the existing bore. It is proposed that a new bore or bores will be installed at the site to provide for the additional capacity. This site is programmed to be upgraded in the near future with standby generation and fluoridation facilities.

It is also already known that the existing Wilson Road water supply site can provide high quality water from the confined aquifer. The Council has investigated the likely impacts of an increased water take at the Wilson Road site, which has indicated that any potential for adverse effects from an increased take of groundwater are likely to be minor. Refer to separate memorandum from the Water Services Manager to the Group Manager: Strategic, dated 24 June 2009 in Appendix E.

From discussions with the Council's Water Supply Manager it has been confirmed that there is sufficient existing consented capacity in terms of rate and volume available from the Wilson Road site to service

the consumptive demand from the proposed new industrial area. However, additional capacity is required to meet fire-fighting requirements for the plan change area. The water take required to meet fire-fighting requirements does not require a resource consent.

The water supply costs are based on a new supply main connection to Flaxmere with an upgraded bore at Wilson Road to meet fire-fighting capacity requirements.

Upgrading the existing Wilson Road site is preferred by the Council rather than locating a new water source / supply facility closer to the proposed new industrial area. Such an approach minimises source locations and allows for centralisation of investment thereby providing for the efficient use of existing infrastructure.

A completely separate water supply source for the development (located within or close to the plan change area) would potentially have a lower capital cost. There would be savings on the cost of the water supply main to the development, however there would be additional infrastructure required including a building, standby generator, treatment facilities and water storage as well as land for these facilities. Initial consideration of this indicates that the potential cost savings for a stand-alone system over a system connected to Flaxmere would, very roughly, be in the order of $200,000.

However, a completely separate water supply system is not desirable from an overall asset management perspective, and there are significant additional risks with regards to the quality and quantity of water at the site (which are unknown and would require substantial investigations to clarify), increasing the uncertainty of costs and making this option not favoured. Also, the National Environmental Standard for Sources of Human Drinking Water now encourages location of drinking water sources away from areas of potential contamination such as industrial uses.

5.3 Pipe Network

The water supply main to the industrial area and the associated rider mains within the development area are sized based on the required fire-fighting water supply. This is because the water supply flow rate required for the development is significantly less than the fire-fighting flow required, especially at the extremities of the development area along Maraekakaho Road.

6 Wastewater

6.1 Introduction

Earlier assessments have identified that the provision of a fully reticulated gravity sewer system along road boundaries would provide the greatest flexibility and long term security in the face of uncertainty over demand for wastewater services.

Consideration had been given to on-site treatment and disposal. However, this option was not favoured because of the:

- relatively large size of area to be serviced by on-site systems (115ha);
- potential ongoing issues with lack of maintenance and/or management;
- proximity of the Hastings and Flaxmere urban areas, with existing reticulated wastewater systems;
- rapidly drained soils over most of the area, with an associated higher risk of groundwater contamination because of limited treatment available from the soils for on-site disposal systems;
- cost to extend the reticulated system to the new industrial area would be similar or less than on-site treatment and disposal, when total costs are considered (both Council and landowner costs) for the wastewater flow assumed.

The concept design for a conventional reticulated sewerage system identified the need for deep sewers, multiple pump stations and long lengths of rising main to connect to the existing sewer trunk network. This has led to consideration of the option of a pressure sewer system, with each property pumping into a pressure sewer reticulation.

Consideration has also been given to the location that the wastewater system for the proposed new industrial area connects into the existing Council wastewater network. Two options have been considered:

- connection to the existing gravity trunk sewer in Hastings (intersection of Francis Hicks Avenue/Pepper Street)
- connection to the Flaxmere wastewater pump station in Wilson Road.

Details for each of these options are covered in the following sections.

6.2 Level of Service and Design Demands

The ECOP notes that the design demand for industrial areas shall be on the basis of actual flows, where known. Where information is not available the design flows for industrial sewers are:

- Light industrial 0.5 l/s/ha
- Medium industrial 0.7 l/s/ha
- Heavy industrial 1.3 l/s/ha

The proposed development is assumed to not have any significant trade waste requirement, with wastewater being predominately sanitary sewage. On this basis a domestic sewer reticulation system would be provided within the development area that would connect into the Council's domestic sewer system with no separate trade waste sewer provided.

The Water Services Bylaw 2009 has requirements with regard to controlling the quantity and quality of any discharge of wastewater to the Council's sewerage system.

The proposed new industrial area is expected to be light (water usage) industrial type of development and therefore the level of service proposed based on the ECOP is 0.5 l/s/ha as a peak wastewater flow and is consistent with that adopted for the water supply. This allowance is expected to be more than adequate to cater for actual wastewater requirements from the ultimate development.

The design demands for a conventional sewerage system allow for a component of groundwater infiltration and inflow into the sewer during peak wet-weather flow events. If an alternative sewerage system is provided (i.e. a pressure sewer system), then peak wet-weather flows are expected to be lower due to elimination of groundwater infiltration. The comparison between the two options is shown in Table 6-1 below.

Table 6-1 : Wastewater Peak Flow Comparison

	Conventional Sewerage	Pressure Sewerage
Average Dry-Weather Flow Allowance	11 m^3 / day / ha	11 m^3 / day / ha
Development Area (ha)	115	115
Average Dry Weather Flow (m^3/day)	1265	1265
Average Dry Weather Flow (l/s)	14.4	14.4
Peaking Factor – Dry Weather	2	2
Peaking Factor – Wet Weather (assumed)	2	1.3
Peak Dry Weather Flow (l/s)	28.8	28.8
Peak Wet-weather Flow (l/s)	57.5	37.4

The average dry-weather flow allowance above allows for sanitary wastewater flows from light industry and only minor trade waste discharges.

6.3 Conventional Sewerage

A concept design for a conventional sewerage system, with sewers provided along existing roads within the development area, is detailed on the drawings contained in Appendix A. Summary details are:

- Deep sewers required, up to 4m in depth near the proposed pump station at the intersection of Maraekakaho Road and Irongate Road. Note that at this depth it is expected that a large proportion of the sewer network would be below groundwater level, especially during wet-periods when groundwater levels are expected to be elevated.
- Not all of the plan change area could connect via a gravity sewer (i.e. part of the area would require pumped sewer connections). Refer to the wastewater plan (C02) in the Appendix A that shows the indicative extent of property that would be feasible to service by a gravity sewer connection.
- A new pump station and a 2.5 km rising main will be required to discharge into the existing sewer trunk network in Francis Hicks Avenue in Hastings.
- Twin rising main (two by 150mm diameter pipes) to provide for staged development and the associated increase in wastewater flows over time as the development progresses. Refer to further details on this below in regards minimising storage times of wastewater in rising mains. The twin main also provides for operational flexibility in the event of maintenance or repairs to be carried out to one of the mains but still allowing the system to continue to function.
- An additional pump station and rising main would be required to service the south-western end of the plan change area, shown as Area (c).

There are other options that could be considered during the design phase for the conventional sewerage system as part of design development. This includes providing additional pump stations, both within existing road reserve and within the properties, to reduce the depth required for the gravity sewer. This would also increase the development area that could be serviced by a gravity sewer connection, rather than a pumped connection, from individual properties. However, the additional pump stations, with shallower sewers would potentially increase the capital cost for the works.

Earlier reports indicated the need to consider potential problems with odours and sulphides in the sewage developing due to extended storage times in pump stations and rising mains. These issues will need to be addressed during the detailed design phase to minimise the potential for these problems to develop. This includes provision of twin rising mains, design of pump station and operating regime to minimise holding times and provide adequate flow velocity during pumping cycles to prevent slime build-up. The rising main outlet design will need to include ventilation and venting to minimise odour problems and impacts on the downstream network from hydrogen sulphide generation and potential corrosion of the concrete sewer. Careful detailing of outlets and transitions will be required to minimise turbulence.

It is considered that there are technically feasible options that can be readily used to address these issues at the design phase, with the cost estimates including provision for these works.

6.4 Pressure System Option

As identified above the conventional sewerage system will require deep sewers and several pump stations to service the development. An alternative option of a pressure reticulation system has been considered to reduce costs. There are a number of pressure sewerage technologies available and include:

- STEP (Septic Tank Effluent Pumping) – where individual properties have septic tank systems and effluent from these is pumped into a pressure sewerage collection system.

- Grinder pumps – where individual properties, or clusters of properties, have a pump chamber and grinder pump that macerates all wastes and conveys the material under pressure through smaller diameter pressure sewers to the existing gravity network.

This assessment has focussed on the grinder pump option, where all sewage is discharged from each property to the sewerage collection system. The main reason for this is that under the STEP option there is an accumulation of solids in septic tanks that will need to be removed periodically by tanker trucks.

The following section details a comparison between conventional and pressure sewerage systems.

6.5 Comparison of Conventional versus Pressure Sewer Systems

A comparison of the two types of sewerage system considered are detailed in Table 6-2 below. It is expected that as part of the preliminary design phase for the development that the option to be used will be confirmed, following further investigations and assessment.

At this stage a conventional system has been assumed for the cost estimates presented in this report and also included in Council's LTCCP process. This option has a higher capital cost, for the Council component, than a pressure system, and as such represents a worst-case scenario for Council.

If a pressure sewer option is to be pursued, it is recommended that a terminal pump station and rising main, as per the conventional sewer option, is provided. This would increase cost but avoid some operational aspects for the 2.5km rising main, without a separate pumping system. These include controlling the required velocity in the pipe to minimise the settling of solids and other aspects that may lead to odour and corrosion problems in the existing Council network where the system discharges.

Table 6-2 : Wastewater Option Comparison

Aspect	Conventional	Pressure (Grinder)
Technology	Widespread use throughout NZ. Proven technology.	Limited use, but developing technology with increased use, typically in residential applications.
Sewer Pipe Size	Larger mains required to handle solids.	Smaller mains are adequate due to macerated waste.

Aspect	Conventional	Pressure (Grinder)
Sewer Pipe Depth	Need to be laid to grade, with deep pipes to service development in flat areas.	Can be laid to match ground contour with shallow pipe depths.
Pump Stations – Off-Lot	Several pump stations required.	Terminal pump station would be preferred to control operation and flows in transfer main to Hastings.
Pump Stations – On -lot	Some isolated areas may require individual properties to have a pump station.	Each lot will require a grinder pump system. Could possibly cluster but would be limited due to larger lot sizes proposed for the new industrial area (minimum 1 hectare). Large number of individual pump stations.
On-going Energy Use	Requirement for on-going pumping of sewage – low head lift pump stations	All sewage pumped to a higher pressure to convey in smaller diameter pipes with increased on-going energy use. Higher energy use than conventional sewage.
Maintenance	Relatively low-maintenance and low operating costs.	Grinder pump systems will require periodic maintenance. Maintenance will be the responsibility of the owners.
Capital Cost	High initial capital cost. Also risk of encountering difficult trenching conditions increasing installation costs.	Lower initial capital cost, especially for the Council component. Owners will be required to make up front investment in on-site infrastructure (grinder pump system) and meet ongoing maintenance and operation costs.
Inflow & Infiltration	Susceptible, especially to infiltration with deep sewers below groundwater level.	Infiltration generally eliminated as system pressurised, but inflow still possible.
Difficult Terrain	Expensive option	Flexibility to handle difficult terrain.
Manholes	Required at regular spacing in network.	Not required.
Power Outages	Pump stations not operable during power failure. Storage available in network and pump stations to allow for power failures during dry-weather.	Limited storage within grinder pump chamber to allow for power failure. Possible overflow of chamber in power outage.
Odours/ Sulphide	Generally low potential, but will need to be carefully considered in design of pump stations and long rising mains to avoid odour and sulphide problems in downstream trunk sewer network.	Pressurised sewer system has greater potential for odours and sulphide generation. Likely to be a greater problem in early stages of development when flows are lower and velocities in the pressure sewers are low. Use of terminal pump station for transfer to the existing Council network would minimise potential problems.
Off-lot Costs	Rough Order Cost of $4.07M.	Rough Order Cost of $3.15M.
On-lot Costs (On-site plumbing and reticulation)	Site dependent. Consist of internal plumbing, pump stations and pipework to Council sewer. Indicative assessment of $2.3M.	Site dependent. Consist of internal plumbing and pipework to Council sewer. . This includes a grinder pump station for each lot, size dependent on flow. Expect for 1ha lots approximately $20,000 for a grinder pump system. This includes isolating valve and non-return valve at boundary (connection to the Council system). Total for plan change area depends on number of lots and size, but is estimated at around $2.0 M.
Operational aspects	Pump system can be sited and operated to control pump flow and velocity.	Potential problem controlling velocities and flows (or sizing of mains) especially in final transfer main (2.5km length) to Hastings if no terminal pump station provided. Risk on non-return valve failure and overflow of sewage at individual sites.

6.6 Connection to Existing Reticulation

The connection point assumed for the Irongate wastewater system into the Hastings wastewater network is into the western interceptor at the intersection of Francis Hicks Avenue and Pepper Street. Another option is to discharge to the Flaxmere reticulation or sewer pump station in Wilson Road.

The Flaxmere sewer pump station is adjacent to the water supply source site where the water supply for the Irongate development is to be provided. Under this option the sewer rising main to connect the Irongate development with the existing Council network could be laid in conjunction with the new water main to supply the development. This would reduce the total cost for the two pipelines, by reducing trenching installation costs. It could also reduce overall disruption to the roading network, depending on the extent of upgrading of the existing network required.

The length of rising main required to connect to the Flaxmere pump station is 3km. This is a longer length than that required to connect to the western interceptor in Hastings of 2.5km. However, there is an additional length of gravity main required along Pepper Street making the total length, to connect to the Council network under each option, similar at around 3km. With the reduced installation cost for the Flaxmere option from a shared installation with the water main, there is estimated to be a potential cost saving for the rising main/connection component in the order of $500,000.

It is understood from discussion with Council's Drainage Service Manager that there is some limited capacity available within the existing system (Flaxmere pump station and downstream network), but this is currently tagged to allow for future growth in Flaxmere. To provide for the ultimate Irongate development design flows and also the future growth allowance for Flaxmere, the following additional upgrading works may be required:

- Upgrading of the Flaxmere pump station to increase capacity.
- Rising main from the Flaxmere pump station along Wilson Road to Manchester Street may need to be duplicated, a length of 1.5km, or higher pressure pumps installed to cater for the higher flow.
- Gravity sewer along Wilson Road and Omahu Road may need to be upgraded.
- Frimley domestic interceptor may need to be upgraded or the Heretaunga Street sewer to Tomoana Road may need to be upgraded.

The exact requirements have not been quantified, however from discussion with the Council's Drainage Service Manager, overall the option of discharging to the Flaxmere sewer pump station is not considered feasible, for any of the staging options, given the limitations of existing infrastructure, including the downstream network capacity.

Overall the total cost for Flaxmere option is expected to be significantly greater than for connecting to the western interceptor. Also the Flaxmere option does not make efficient use of capacity in the existing reticulation network.

The Flaxmere connection option may still be worth considering at the design phase as it could reduce the Council's initial capital expenditure. A connection to Flaxmere could be provided initially, but the upgrade works (Flaxmere pump station and downstream network) could be delayed and only implemented once development in the industrial area has advanced and peak wastewater flows have reached around say 20 l/s, possibly once Stage 1 is complete. However, the timing and extent of upgrades required to existing infrastructure would require detailed investigations and assessment. This would include the cost and benefits of each option from a staging perspective.

The Council is in the process of developing a wastewater network model, which will assist in evaluating more accurately network bottlenecks and areas with spare capacity. It is recommended that further consideration is given to the Flaxmere connection option as part of the detailed design phase, utilising the network model if available.

7 Stormwater

A separate report has been prepared in relation to the assessment of the options and feasibility of stormwater services for the proposed new industrial area. This report details the stormwater management solution recommended for the new industrial area, which comprises a combination of on-site solutions (disposal of stormwater from roof areas to ground and direct discharge to Irongate Stream or on-site treatment and disposal to ground) and reticulated solution (swales and attenuation with discharge to the Sisson Drain).

8 General Servicing Considerations

8.1 Limitations of Assessment

This report details findings of a high level assessment of servicing aspects and costs. The details presented will be subject to refinement as part of the detailed design process including more detailed assessment of the required pipe sizes.

8.2 Service Corridors, Reserves and Designations.

The assessment and cost estimates included with this report have focussed on the infrastructure required along existing roads to service the plan change area. With subdivision there will be a need for these services to be extended, potentially along new roads, private accessways or rights of way to be constructed as part of the subdivision. This includes significant sized water supply mains to supply adequate water for fire-fighting to the parts of the plan change area remote from existing roads. It is expected that the individual property developers will pay for extending the infrastructure required to service their development. The extended or additional infrastructure may, in part, remain in private ownership especially where large industrial lots are developed. However, if new roads are constructed this infrastructure may be taken over by Council as a public asset.

Providing specific service corridors for water and wastewater services to be installed would potentially be beneficial and reduce overall cost to both Council and developers. However to be effective the location of these would need to be co-ordinated with expected subdivision arrangements, including size of the new lots, without this, the benefit may be lost and infrastructure that is installed may not be utilised effectively.

At this stage, for water and wastewater, it is not a requirement to define specific corridors, other than to recognise that they will be needed and should be co-ordinated with the future subdivision arrangements. This includes assessment carried out as part of subdivision consent application processes and also engineering design approvals by Council.

8.3 NZTA

The new water and wastewater infrastructure will need to be constructed within Maraekakaho Road (SH50A) and also across the southern extension to the expressway for the new trunk water main.

The NOR consents for the expressway specifically provide for this.

The works on Maraekakaho Road will require agreement with NZTA and a consent for the installation of the services. However, it is anticipated that Maraekakaho Road will be vested to Council once the expressway extension is completed by NZTA, as such, it is possible that Maraekakaho Road may be in the control of Council at the time the infrastructure is constructed.

8.4 Staging and Extent of Plan Change Area

Based on the expected demand for industrial sites it is estimated that the Stage 1 area would be completed and Stage 2 area started within a period of approximately 10 years but possibly longer depending upon the uptake at Whakatu and the timing for the Tomoana corridor. It is unclear what the likely timeframe for the “areas subject to further consideration” would be, with potentially all of these being incorporated into the initial Stage 1 area development, if they are included in the plan change.

There are significant additional costs to service the areas “subject to further consideration”, especially (a) and (c). Costs are significantly higher than that required for the Stage 1 and 2 areas because they are more remote and also have a smaller land area in proportion to the length of road frontage compared to the Stage 1 and 2 areas. As areas (a) and (b) are located on the opposite side of the Irongate Stream, there are also additional costs for stream crossings.

Consideration will be given as part of the statutory process to whether or not it is desirable to include these areas in the plan change given the additional infrastructure costs. It is however feasible to provide water and wastewater services to these areas, albeit at a greater cost and with some limitations.

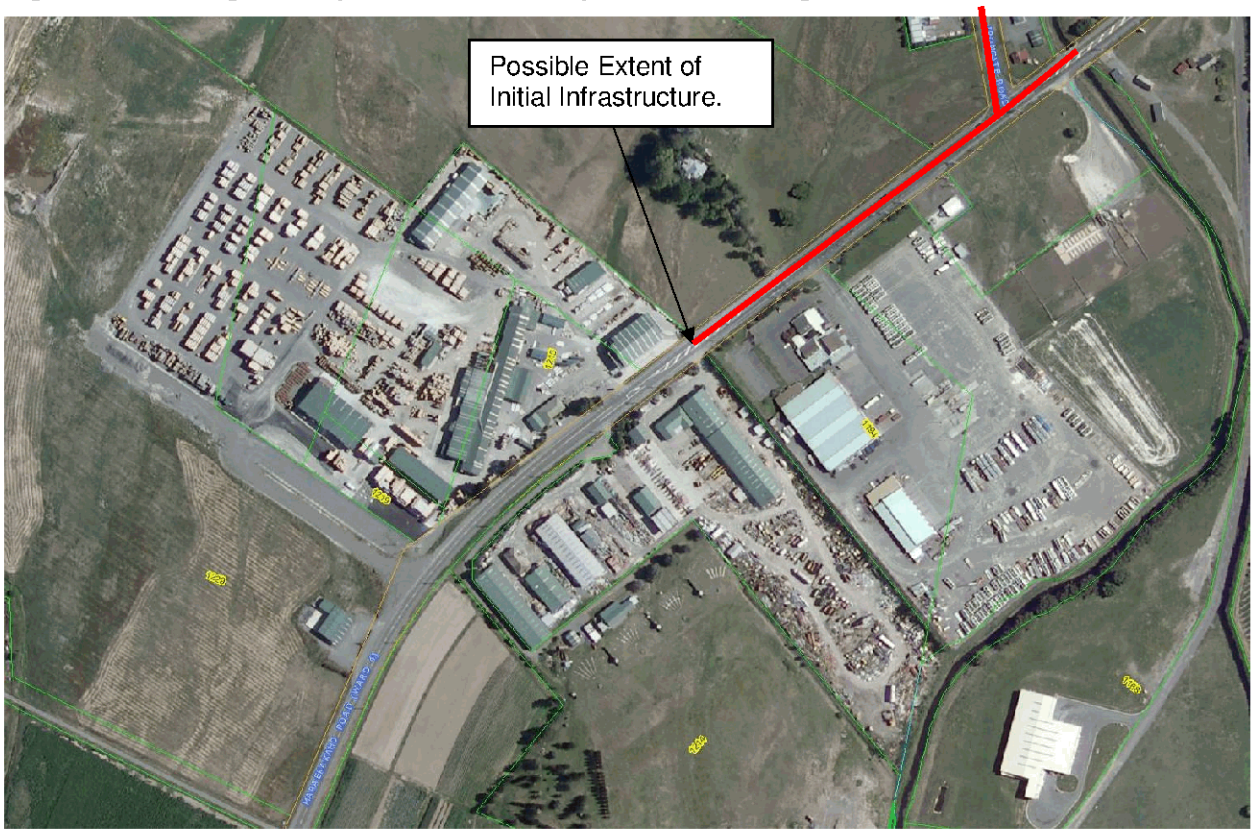
8.5 Extent of Infrastructure Provided

The option cost estimates and drawings (Appendix A and B) show infrastructure provided along existing road reserves to the outer extents of the proposed plan change area. However, to reduce Council expenditure consideration should be given during design to only extending pipe networks to the nearest property boundary at the extents of the plan change area. This would mean infrastructure would be available to the developers at the property boundary, but may need to be extended by them, either along the road reserve or within the development, to service their development.

There are large areas of the proposed plan change area on Maraekakaho Road that are currently developed (i.e. Tumu Timbers of 4.5ha, Walmsley Contracting 4ha and Farmers Transport 2.5ha), occupying approximately 11ha of the 50ha possibly available to be included in Stage 1. These areas are currently serviced with private systems and may not require the proposed water and wastewater services provided for the overall development, at least in the short-term. As part of the design and construction phases of providing services, consideration should be given to limiting the extent of services provided along Maraekakaho Road in the vicinity of these existing developed areas, especially if area (c) does not form part of the plan change area. Refer to Figure 8.1 below showing existing developments with the proposed plan change area.

The above considerations have the potential to reduce the initial and possibly total cost to Council. They would also reduce the potential for infrastructure to be installed by Council that does not end up being used or required by the ultimate development.

Figure 8.1 Existing Development Areas in Proposed Plan Change Area



9 Rough Order Cost Estimates

9.1 Option Cost Summary

A number of options on the extent and staging of the plan change area have been assessed. These are detailed on the drawings in Appendix A, which show the various areas and also the concept design for the water and wastewater infrastructure.

Rough order costs for the provision of water and wastewater infrastructure are detailed in the cost estimate breakdown in Appendix B, with summary details provided in Tables 9-1 to 9-3 below.

Table 9-1 : Council Cost Summary

		Option 1	Option 2	Option 3	Option 4	Option 5
	Areas Serviced (1st)	Stage 1 GF	Stage 1 All	Opt 1, a & b	Opt 2, a, b & c	All Areas
	Areas Serviced (2nd)	Stage 2	Stage 2	Stage 2	Stage 2	-
	Area Serviced (ha) (1st)	34.3	51.6	48.5	72.1	110.3
	Area Serviced (ha) (2nd)	38.2	38.2	38.2	38.2	-
	Area Serviced (ha) (Total)	72.5	89.8	86.7	110.3	110.3
Water	Stage 1	$2,750,000	$3,250,000	$2,960,000	$3,530,000	$3,890,000
Water	+ Stage 2 @ 10 years	$410,000	$410,000	$410,000	$410,000	
Total		**$3,160,000**	**$3,660,000**	**$3,370,000**	**$3,940,000**	**$3,890,000**
Cost /ha		$44,000	$41,000	$39,000	$36,000	$36,000
Wastewater (Pressure)	Stage 1	$1,300,000	$2,000,000	$1,800,000	$2,310,000	$2,710,000
Wastewater (Pressure)	+ Stage 2 @ 10 years	$1,490,000	$1,090,000	$1,090,000	$1,090,000	
Total		**$2,790,000**	**$3,090,000**	**$2,890,000**	**$3,400,000**	**$2,710,000**
Cost /ha		$39,000	$35,000	$34,000	$31,000	$25,000
Wastewater (Gravity)	Stage 1	$2,130,000	$2,350,000	$2,210,000	$2,920,000	$3,130,000
Wastewater (Gravity)	+ Stage 2 @ 10 years	$1,810,000	$1,770,000	$1,770,000	$700,000	
Total		**$3,940,000**	**$4,120,000**	**$3,980,000**	**$3,620,000**	**$3,130,000**
Cost /ha		$55,000	$46,000	$46,000	$33,000	$29,000
Total Water & Wastewater - (Gravity Wastetwater)		$7,100,000	$7,780,000	$7,350,000	$7,560,000	$7,020,000
Total Cost /ha - (Gravity Wastewater)		$99,000	$87,000	$85,000	$69,000	$65,000
Total Water & Wastewater - (Pressure Wastetwater)		$5,950,000	$6,750,000	$6,260,000	$7,340,000	$6,600,000
Total Cost /ha - (Pressure Wastewater)		$83,000	$76,000	$73,000	$67,000	$61,000

Table 9-2 : Additional Costs for "Areas Subject to Further Consideration"

		Option 3		Option 4		
	Areas Serviced	a	b	a	b	c
	Area Serviced (ha)	4	10.2	4	10.2	6.3
Water		$60,000	$150,000	$60,000	$150,000	$70,000
Cost /ha		$15,000	$15,000	$15,000	$15,000	$12,000
Wastewater (Pressure)		$140,000	$360,000	$40,000	$90,000	$180,000
Cost /ha		$35,000	$35,000	$10,000	$9,000	$29,000
Wastewater (Gravity)		$20,000	$60,000	$80,000	$200,000	$290,000
Cost /ha		$5,000	$6,000	$20,000	$20,000	$47,000

Table 9-3 : Total Cost Summary

		Option 1	Option 2	Option 3	Option 4	Option 5
	Areas Serviced (1st)	Stage 1 GF	Stage 1 All	Opt 1, a & b	Opt 2, a, b & c	All Areas
	Areas Serviced (2nd)	Stage 2	Stage 2	Stage 2	Stage 2	-
	Area Serviced (ha)	34.3	51.6	48.5	72.1	110.3
	Area Serviced (ha) (2nd)	38.2	38.2	38.2	38.2	-
	Area Serviced (ha) (Total)	72.5	89.8	86.7	110.3	110.3
Water	Stage 1	$2,750,000	$3,250,000	$2,960,000	$3,530,000	$3,890,000
Water	+ Stage 2 @ 10 years	$410,000	$410,000	$410,000	$410,000	$0
Onsite Costs (Developer/Property Owner)		$1,030,000	$1,270,000	$1,230,000	$1,570,000	$1,570,000
Total		**$4,190,000**	**$4,930,000**	**$4,600,000**	**$5,510,000**	**$5,460,000**
Cost /ha		$58,000	$55,000	$54,000	$50,000	$50,000
Wastewater (Pressure)	Stage 1	$1,300,000	$2,000,000	$1,800,000	$2,310,000	$2,710,000
Wastewater (Pressure)	+ Stage 2 @ 10 years	$1,490,000	$1,090,000	$1,090,000	$1,090,000	$0
Onsite Costs (Developer/Property Owner)		$1,720,000	$2,130,000	$2,060,000	$2,620,000	$2,620,000
Total		**$4,510,000**	**$5,220,000**	**$4,950,000**	**$6,020,000**	**$5,330,000**
Cost /ha		$63,000	$59,000	$58,000	$55,000	$49,000
Wastewater (Gravity)	Stage 1	$2,130,000	$2,350,000	$2,210,000	$2,920,000	$3,130,000
Wastewater (Gravity)	+ Stage 2 @ 10 years	$1,810,000	$1,770,000	$1,770,000	$700,000	$0
Onsite Costs (Developer/Property Owner)		$2,010,000	$2,490,000	$2,400,000	$3,060,000	$3,050,000
Total		**$5,950,000**	**$6,610,000**	**$6,380,000**	**$6,680,000**	**$6,180,000**
Cost /ha		$83,000	$74,000	$74,000	$61,000	$57,000
Total Water & Wastewater - (Gravity Wastetwater)		$10,140,000	$11,540,000	$10,980,000	$12,190,000	$11,640,000
Total Cost /ha - (Gravity Wastewater)		$141,000	$129,000	$128,000	$111,000	$107,000
Total Water & Wastewater - (Pressure Wastetwater)		$8,700,000	$10,150,000	$9,550,000	$11,530,000	$10,790,000
Total Cost /ha - (Pressure Wastewater)		$121,000	$114,000	$112,000	$105,000	$99,000

9.2 Selected Rezoning Option Cost Summary

As a result of consideration of the information provided in all of the supporting reports, assessments and analysis completed as part of the plan change process a final rezoning option has been selected. This area to be rezoned for industrial purposes is shown on the plans contained in Appendix C.

The selected rezoning option rough order costs for the provision of water and wastewater infrastructure to the area to be rezoned for industrial purposes are detailed in the cost estimate breakdown contained in Appendix D, with summary details provided in Tables 9-4 to 9-5 below. Refer also to drawings in Appendix C.

The selected rezoning option has cost estimates for water and wastewater services based on a reduced extent of infrastructure. That is infrastructure only provided to the nearest property boundary, not the full road frontage of the property within the plan change area. Refer to the concept design drawings for the selected rezoning option in Appendix C.

Table 9-4 : Council Cost Summary

	Stage 1 Area (ha)	39.2
	Stage 2 Area (ha)	43.0
	Area Serviced (ha) (Total)	82.2
Water	Stage 1	$2,870,000
Water	+ Stage 2 @ 10 years	$430,000
Total		**$3,300,000**
Cost /ha		$41,000
Wastewater (Pressure)	Stage 1	$1,590,000
Wastewater (Pressure)	+ Stage 2 @ 10 years	$1,560,000
Total		**$3,150,000**
Cost /ha		$39,000
Wastewater (Gravity)	Stage 1	$2,210,000
Wastewater (Gravity)	+ Stage 2 @ 10 years	$1,860,000
Total		**$4,070,000**
Cost /ha		$50,000
Total Water & Wastewater - (Gravity Wastetwater)		$7,370,000
Total Cost /ha - (Gravity Wastewater)		$91,000
Total Water & Wastewater - (Pressure Wastetwater)		$6,450,000
Total Cost /ha - (Pressure Wastewater)		$80,000

Table 9-5 : Total Cost Summary

	Stage 1 Area (ha)	39.2
	Stage 2 Area (ha)	43.0
	Area Serviced (ha) (Total)	82.2
Water	Stage 1	$2,870,000
Water	+ Stage 2 @ 10 years	$430,000
Onsite Costs (Developer/Property Owner)		$1,170,000
Total		**$4,470,000**
Cost /ha		$55,000
Wastewater (Pressure)	Stage 1	$1,590,000
Wastewater (Pressure)	+ Stage 2 @ 10 years	$1,560,000
Onsite Costs (Developer/Property Owner)		$1,950,000
Total		**$5,100,000**
Cost /ha		$63,000
Wastewater (Gravity)	Stage 1	$2,210,000
Wastewater (Gravity)	+ Stage 2 @ 10 years	$1,860,000
Onsite Costs (Developer/Property Owner)		$2,270,000
Total		**$6,340,000**
Cost /ha		$78,000
Total Water & Wastewater - (Gravity Wastetwater)		$10,810,000
Total Cost /ha - (Gravity Wastewater)		$133,000
Total Water & Wastewater - (Pressure Wastetwater)		$9,570,000
Total Cost /ha - (Pressure Wastewater)		$118,000

9.3 Assumptions and Exclusions in Rough Order Cost Estimates

9.3.1 General

The cost estimates are for Council infrastructure along existing roads. No allowance is included for water services pipework through existing private property that would be required as part of subdivision and development works (i.e. works that will be the responsibility of the developer).

An allowance for the following is included in the cost estimates:

- Preliminary & General (P&G) costs of 10% of physical works costs.
- Professional Services, including investigations, engineering design and resource consents, of 15% of physical works cost including P&G costs.
- Contingency allowance of 25% of total cost.

The cost estimates are presented for budgeting purposes and are a “rough order of cost” assessment based on the concept design presented, with an accuracy range of + or – 30%.

The additional costs for "Areas Subject to Further Consideration", for the wastewater costs, include a proportion, based on area serviced, of the additional costs for the upsizing of mains. Costs for areas (a) and (b) have been split in proportion to the area serviced.

The "on-site" costs (costs to developers and property owners) assessment has a number of assumptions in regards to the future layout and size of industrial developments within the plan change area. These include:

- costs assessed for the full development area of approximately 110ha;
- an average lot size of 2ha;
- allowance for 2.8km of new wastewater and water supply mains within the plan change area;
- allowance for an average length of property connection of 75m;
- for the gravity wastewater option allowance for 5 small pump stations within the plan change area. These are to allow for parts of the development that are not feasible to connect via a new gravity main; and
- a cost per hectare calculated for the "on-site" costs. This has then been used for each of the options (options 1 to 5) and selected rezoning final option to give an approximate cost.

Tables 9-1 and 9-4 are a cost summary that includes the estimated costs for the Council. These are for infrastructure along existing road reserves to service the development. Tables 9-2 and 9-5 include these infrastructure costs as well as the estimated costs to the developers or property owners for extending infrastructure to service subdivisions and individual properties.

9.3.2 Wastewater

An allowance has been made for land purchase for the large pump station, which is expected to be part of the land acquisition for improvements to the Maraekakaho Road and Irongate Road intersection. It has been assumed that the wet-well would be located within the road reserve, and there is only a basic roadside cabinet for electrical and controls. No allowance is provided for emergency storage, only allowing for storage within the wet well and sewer network in the event of power failure or mechanical breakdown. No cost allowance for permanent standby generator facilities has been included, with reliance on Council's portable generator to be used in the event of a prolonged power outage.

The wastewater costs include a nominal allowance for odour and sulphide treatment. However, this is subject to further consideration as part of detailed design to confirm exact requirements and costs.

All tables include costs for two options for the wastewater system: pressure system and a conventional type gravity system. The pressure system option includes an allowance for a terminal pump station at the intersection of Maraekakaho Road and Irongate Road to pump the wastewater to the Hastings network in a controlled manner.

9.3.3 Water

Funding is included to upgrade the existing public water source at Wilson Road in Flaxmere with the provision of a new bore and headworks. Funding is also included on an area basis for provision of additional water reservoir storage within the Hastings network.

10 Conclusions

The main conclusions from the water services assessment are:

(a) Servicing of the proposed new Irongate industrial area for water and wastewater is feasible.

(b) Significant expenditure is required on extension and upgrade of the existing water and wastewater networks in Hastings and Flaxmere to service the proposed new industrial area.

(c) The assumed demand for assessing infrastructure requirements is expected to be more than adequate to cover for the actual water and wastewater demand from the expected "light" industrial development.

(d) Measures are needed to limit the quantity of water used and also the quantity and quality of wastewater discharged from individual developments within the plan change area.

(e) There are a number of options for servicing the development including the point where the wastewater system would connect to the existing Council network and also the type of sewer system to be provided (i.e. conventional or pressure type).

(f) Estimated costs for servicing the future development (based on a conventional wastewater system), excluding services along internal roads or within development, range from around $61,000/ha to $99,000/ha, depending on the extent of the plan change area. Including the "on-site" costs increases total assessed costs for water and wastewater services to a range of $99,000/ha to $141,000/ha.

(g) The additional cost to service areas (a) and (c) are relatively high, being more remote from the existing infrastructure. Also, because these areas have a longer road frontage in relation to the land area serviced, the cost to Council in providing services is higher in comparison with the other areas in the development.

11 Recommendations

The following is recommended with regard to water services for the proposed plan change:

(a) That Council considers the findings of this report including the estimated costs as part of the decision making process on whether and / or to what extent to proceed with the proposed rezoning of the area for industrial purposes.

(b) That the levels of service for water and wastewater services are confirmed and that measures put in place through the most appropriate statutory mechanisms to limit wastewater discharge and water use to a peak flow of 0.5 l/s/ha, excluding fire-fighting.

(c) That a minimum level for fire-fighting water supply of FW4 be provided to the proposed new industrial area.

(d) That as part of the design phase a pressure system is further evaluated compared to a conventional sewerage system, and the preferred options identified and confirmed for implementing with the development.

Appendix A: Option Drawings

Appendix B: Option Cost Breakdown

Appendix C: Selected Rezoning Option Drawings Water and Wastewater Concept Design

Appendix D: Selected Rezoning Option Cost Breakdown

Appendix E: Memorandum from Water Services Manager

HASTINGS DISTRICT COUNCIL

HASTINGS, THE LIFESTYLE OF CHOICE, A PLACE OF OPPORTUNITIES

File Ref WAT-20-10-09-376

To: Mark Clews - Group Manager: Strategic

Date: 24 June 2009

Subject: **Irongate Industrial Plan Change Proposal - Water Supply**

Having reviewed the MWH report on servicing of the proposed Irongate industrial plan change area for water supply, I would like to make the following comments in order to clarify the proposal in support of the plan change.

Source

The proposed source for supply will be from the existing HDC bore site at Wilson Rd. While we have considered locating a new bore site within the development to reduce costs, there were a number of issues that arose from this alternative proposal which make it less desirable including:

- Unknown aquifer parameters (quality and quantity) without specific investigation and testing.
- Potential contamination risk from the proposed industrial development
- The need to provide sufficient stand alone water storage to service the development (significant cost implications)
- The need for new infrastructure (land, buildings, stand-by power) when existing facilities at Wilson Rd are available

Currently, the Wilson Rd bore has sufficient consented spare capacity to supply the total consumptive demand for the Irongate development (based on the proposed level of service of 0.5l/s/ha) and to meet existing demand from the Hastings network. At present only 30l/s of the consented 90l/s is available from the existing bore and pump requiring a separate bore and pump to be constructed to service the entire plan change area.

The Wilson Rd bore is a key strategic source for Council and is known to be in an area of the Heretaunga Plains system capable of delivering high quality and high yielding groundwater. Some concern has been raised regarding future growth impacts in addition to the Irongate proposal and their potential effects on the groundwater system at Wilson Rd given that this site has significant future potential.

Mark Gyopari from Phreatos Groundwater Research and Consulting was engaged to undertake an assessment of the Wilson Rd bore site to determine if there were any potential adverse effects from Council increasing abstraction up to the maximum consented rate and what potential existed for developing additional sources at this location. The report indicates that it is unlikely that any significant effects will result from abstracting up to the consented take but that pump testing be undertaken to establish the key parameters of the theoretical assessment to more accurately determine the potential drawdown effects on the aquifer and existing users from increased abstraction above the 90l/s at the Wilson Rd bore site.

Fire Fighting

The MWH report covers in detail the process for determining the fire fighting capacity requirements to service the industrial area. The assessment included typical fire fighting needs as proposed by

MEMORANDUM

the NZ Fire Service and an evaluation of the likely types of development that may occur with respect to onsite fire fighting systems such as sprinklers, storage or additional fire fighting supplies. We concur with the report recommendation that the proposed FW4 rating provides sufficient flow from fire hydrants such that adequate fire fighting needs can be met and are appropriate for the intended development, and that options for the provision of additional fire fighting needs for higher risk classifications are available and practicable.

Infrastructure Requirements

Initial infrastructure investment is limited to developing the source supply and construction of the trunk and supply water mains within Irongate Rd and Maraekakaho Rd. Further development of the network will proceed in line with development needs and to ensure that adequate fire fighting is available to meet fire service and Code of Practice requirements.

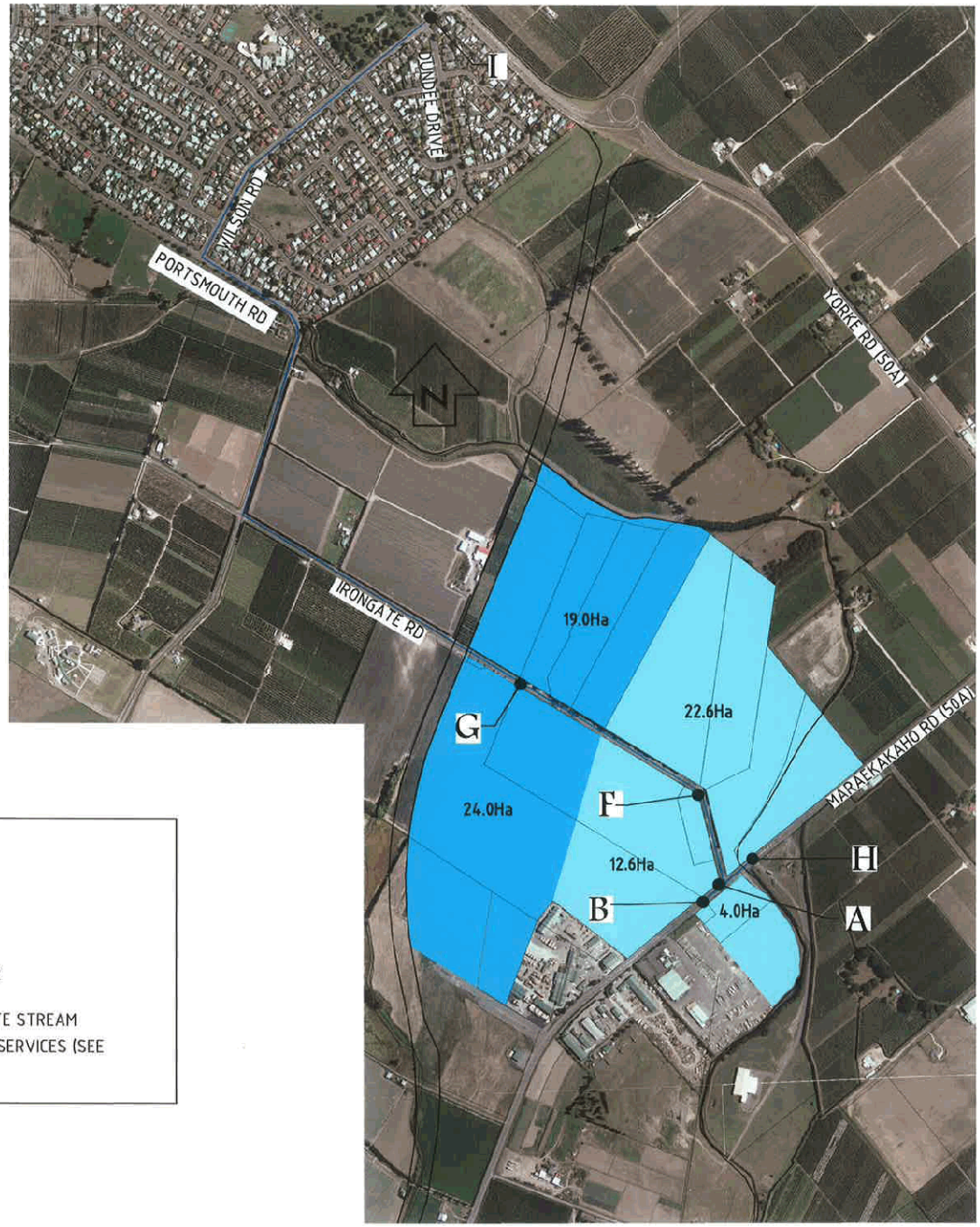
Brett Chapman
Water Services Manager
brettc@hdc.govt.nz

Water - Selected Rezoning Option			
	Area Serviced (ha)	39.2	43.0
	Areas Serviced	Stage 1	+ Stage 2
Section	Length (m)		
a-b	80	150 dia & 200 dia	ok
b-c	220	-	-
c-d	220	-	-
d-e	50	-	-
a-f	240	150 dia & 300 dia	ok
f-g	490	300 dia	150 dia
a-h	100	200 dia	-
g-i	2300	300 dia	ok
a-k	2500	-	-
k-m	550	-	-
k	Discharge Treat	-	-
a	Pump Station	-	-
d	Pump Station	-	-
Dia			
100mm Watermain	Length (m)		
150mm Watermain	Length (m)	320	490
200mm Watermain	Length (m)	180	0
250mm Watermain	Length (m)	0	0
300mm Watermain	Length (m)	3030	0
150mm Valve	No.	6	3
200mm Valve	No.	5	0
250mm Valve	No.	0	0
300mm Valve	No.	6	0
100mm Watermain	$140	$0	$0
150mm Watermain	$210	$67,200	$102,900
200mm Watermain	$250	$45,000	$0
250mm Watermain	$300	$0	$0
300mm Watermain	$400	$1,212,000	$0
Hydrant (100m spacing)	$1,500	$15,000	$14,700
Stream Crossing	$0	$20,000	$0
150mm Valve	$2,200	$13,200	$6,600
200mm Valve	$3,000	$15,000	$0
250mm Valve	$5,500	$0	$0
300mm Valve	$6,500	$39,000	$0
Reservoir Storage Contribution (1 days storage)	$7,000	$137,200	$150,500
Upgrade Flaxmere Bore	$250,000	$250,000	$0
Subtotal		$1,813,600	$274,700
P&G allowance (10%)		$181,360	$27,470
Engineering (15%)		$299,244	$45,326
Contingency (25%)		$573,551	$86,874
TOTAL		**$2,870,000**	**$430,000**
Onsite Costs (Developer/ Property Owner)			
Main (150mm) along Internal Roa	$6,500	$254,800	$279,500
Laterals (150mm dia)	$2,500	$98,000	$107,500
Subtotal		$352,800	$387,000
P&G allowance (10%)		$35,280	$38,700
Engineering (15%)		$58,212	$63,855
Contingency (25%)		$111,573	$122,389
TOTAL		**$560,000**	**$610,000**

Wastewater - Gravity System - Selected Rezoning Option			
	Area Serviced (ha)	39.2	43.0
	Areas Serviced	Stage 1	+ Stage 2
Section	Length (m)		
a-b	80	150 dia	ok
b-c	220	-	-
c-d	220	-	-
d-e	50	-	-
a-f	240	225 dia	150 dia
f-g	490	-	225 dia
a-h	100	150	-
g-i	2300	-	-
a-k	2500	twin 150 dia	+150 dia
k-m	550	225 dia	+225 dia
k	Discharge Treat	Yes	Yes
a	Pump Station	Yes	Yes
d	Pump Station	-	-
Dia			
100mm	Length (m)		
150mm	Length (m)	180	240
225mm	Length (m)	790	1040
300mm	Length (m)		
375mm	Length (m)		
Rising Main (100mm)			
Rising Main (150mm)			2500
Rising Main (200mm)			
Rising Main (twin 150mm)		2500	
Rising Main (twin 200mm)			
100mm	$150	$0	$0
150mm	$205	$36,900	$49,200
225mm	$235	$185,650	$244,400
300mm	$300	$0	$0
375mm	$325	$0	$0
Manhole (90m spacing)	$3,500	$37,722	$49,778
Stream Crossing		$20,000	$10,000
Pump Station - Small	$100,000	$0	
Pump Station - Medium	$250,000	$250,000	$250,000
Pump Station - large	$1,000,000		
Land Purchase - Pump Station	$50,000	$50,000	$0
Rising Main (100mm)	$150	$0	$0
Rising Main (150mm)	$210	$0	$525,000
Rising Main (200mm)	$250	$0	$0
Rising Main (twin 150mm)	$300	$750,000	$0
Rising Main (twin 200mm)	$360	$0	$0
Rising Main Discharge Vent / Tre	$50,000	$65,000	$50,000
Other			
Subtotal		$1,395,272	$1,178,378
P&G allowance (10%)		$139,527	$117,838
Engineering (15%)		$230,220	$194,432
Contingency (25%)		$441,255	$372,662
TOTAL (Initial)		**$2,210,000**	**$1,860,000**
		1.583920302	
Onsite Costs (Developer/ Property Owner)			
New Sewer along Internal Roads	$6,000	$235,200	$258,000
Sewer Laterals (150mm dia)	$7,500	$294,000	$322,500
Pump Stations (low areas)	$4,000	$156,800	$172,000
Subtotal		$686,000	$752,500
P&G allowance (10%)		$68,600	$75,250
Engineering (15%)		$113,190	$124,163
Contingency (25%)		$216,948	$237,978
TOTAL		**$1,080,000**	**$1,190,000**

Wastewater - Pressure System - Selected Rezoning Option			
	Area Serviced (ha)	39.2	43.0
	Areas Serviced	Stage 1	+ Stage 2
Section	Length (m)		
a-b	80	50 dia	ok
b-c	220	-	-
c-d	220	-	-
d-e	50	-	-
a-f	240	80 dia	+100 dia
f-g	490	-	100 dia
a-h	100	50 dia	-
g-i	2300	-	-
a-k	2500	150 dia	+150 dia
k-m	550	225 dia	+150 dia
k	Discharge Treat	Yes	Yes
a	Pump Station	Yes	Yes
d	Pump Station	-	-
Dia			
150mm - Gravity	Length (m)	0	550
225mm - Gravity	Length (m)	550	0
300mm - Gravity	Length (m)	0	0
50mm - Pressure Sewer	Length (m)	180	0
65mm - Pressure Sewer	Length (m)	0	0
80mm - Pressure Sewer	Length (m)	240	0
100mm - Pressure Sewer	Length (m)	0	730
150mm - Pressure Sewer/Rising	Length (m)	2500	2500
Twin 150mm - Rising Main	Length (m)	0	0
200mm - Rising Main	Length (m)	0	0
Twin 200mm - Rising Main	Length (m)	0	0
Valves	No.	10	15
150mm - Gravity	$205	$0	$112,750
225mm - Gravity	$235	$129,250	$0
300mm - Gravity	$300	$0	$0
50mm - Pressure Sewer	$90	$16,200	$0
65mm - Pressure Sewer	$110	$0	$0
80mm - Pressure Sewer	$130	$31,200	$0
100mm - Pressure Sewer	$150	$0	$109,500
150mm - Pressure Sewer	$210	$525,000	$525,000
Twin 150mm - Rising Main	$300	$0	$0
200mm - Rising Main	$250	$0	$0
Twin 200mm - Rising Main	$360	$0	$0
Valves	$1,500	$15,000	$22,500
Manhole (90m spacing)	$3,500	$21,389	$21,389
Stream Crossing		$20,000	$10,000
Pump Station - Small	$100,000		
Pump Station - Medium	$250,000	$250,000	$250,000
Pump Station - large	$1,000,000		
Land Purchase - Pump Station	$50,000	$50,000	$0
Rising Main Discharge Vent / Tre	$50,000	$90,000	$50,000
Other			
Subtotal		$1,002,589	$988,389
P&G allowance (10%)		$100,259	$98,839
Engineering (15%)		$165,427	$163,084
Contingency (25%)		$317,069	$312,578
TOTAL (Initial)		**$1,590,000**	**$1,560,000**
TOTAL (Both Initial and Future Phases)			
Onsite Costs (Developer/ Property Owner)			
New Sewer along Internal Roads	$2,000	$78,400	$86,000
Sewer Laterals (50mm dia)	$3,000	$117,600	$129,000
Pump Stations (Grinder Pumps)	$10,000	$392,000	$430,000
Subtotal		$588,000	$645,000
P&G allowance (10%)		$58,800	$64,500
Engineering (15%)		$97,020	$106,425
Contingency (25%)		$185,955	$203,981
TOTAL		**$930,000**	**$1,020,000**

Water			
	Area Serviced (ha)	39.2	43.0
	Areas Serviced	Stage 1	+ Stage 2
Section	Length (m)		
a-b	80	150 dia & 200 dia	ok
a-f	240	150 dia & 300 dia	ok
f-g	490	300 dia	150 dia
a-h	100	200 dia	-
g-i	2300	300 dia	ok



LEGEND

- STAGE 1
- STAGE 2
- IRONGATE STREAM
- WATER SERVICES (SEE TABLE)

ORIGINAL SIZE A1 — DO NOT SCALE - IF IN DOUBT, ASK

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
D	SELECTED REZONING OPTION	PC	WAH	TG	04/09
A	REPORT - APRIL 2009	AP	WAH	TG	04/09

	Name	Date
SURVEYED		
DESIGNED	W.HODSON	12/08
DESIGN CHECK	DY	12/08
DRAWN	P.CHILTON	04/09
DRAWING CHECK	W.HODSON	04/09
APPROVED	TG	04/09

MWH

HASTINGS DISTRICT COUNCIL

HASTINGS DISTRICT COUNCIL
IRONGATE INDUSTRIAL PLAN CHANGE

WATER AND WASTEWATER SERVICES
WATER - CONCEPT DESIGN - SELECTED REZONING OPTION

Status/Group: PRELIMINARY
Date/Group: 16/06/2009
SCALES (A1) NTS
Z1462302 | C102 | B

XREFS :

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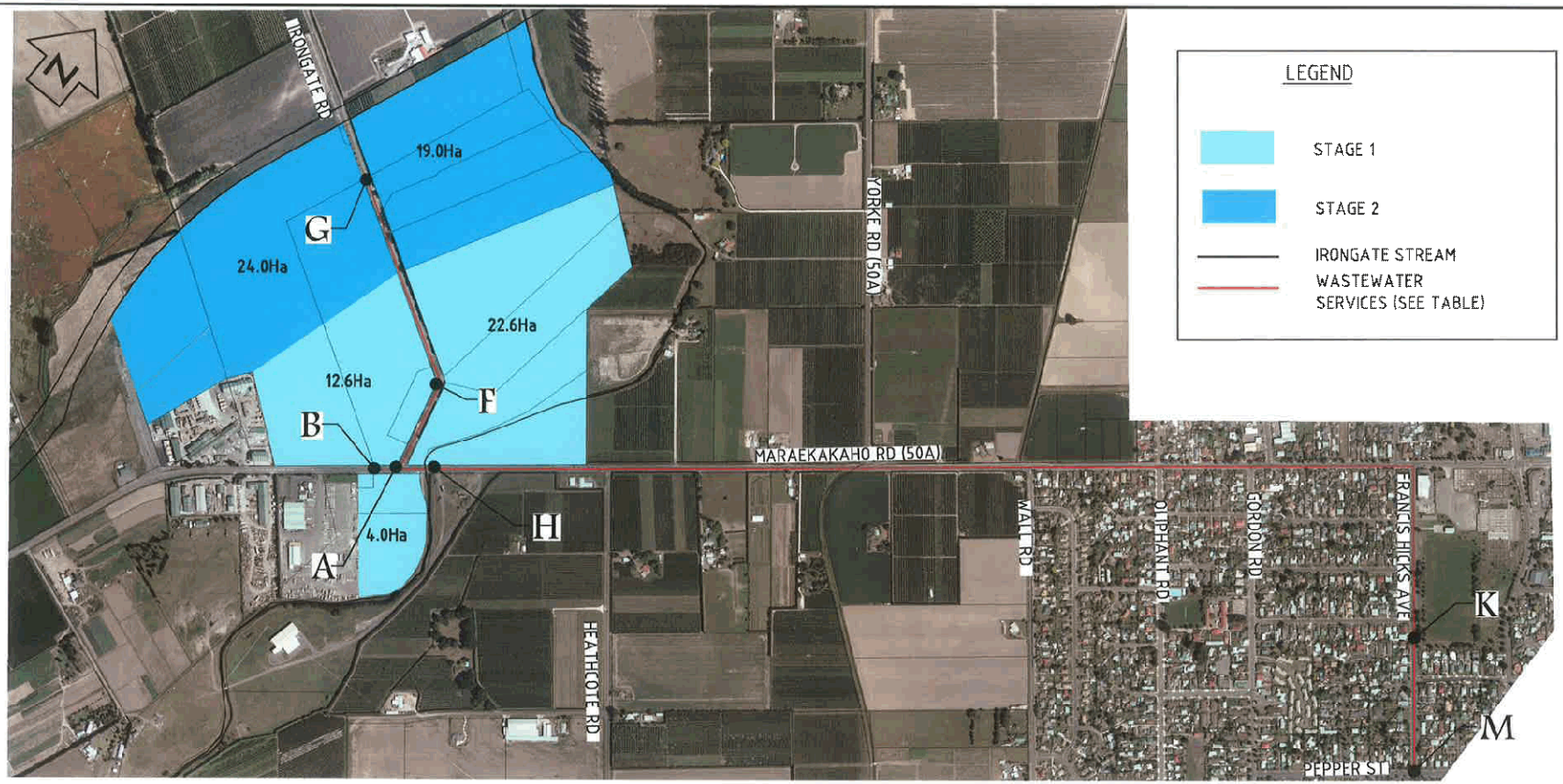

Wastewater - Pressure System			
	Area Serviced (ha)	39.2	43.0
	Areas Serviced	Stage 1	+ Stage 2
Section	Length (m)		
a-b	80	50 dia	ok
a-f	240	80 dia	+100 dia
f-g	490	-	100 dia
a-h	100	50 dia	-
a-k	2500	150 dia	+150 dia
k-m	550	225 dia	+150 dia
k	Discharge Treat	Yes	Yes
a	Pump Station	Yes	Yes

Wastewater - Gravity System			
	Area Serviced (ha)	39.2	43.0
	Areas Serviced	Stage 1	+ Stage 2
Section	Length (m)		
a-b	80	150 dia	ok
a-f	240	225 dia	150 dia
f-g	490	-	225 dia
a-h	100	150	-
a-k	2500	twin 150 dia	+150 dia
k-m	550	225 dia	+225 dia
k	Discharge Treat	Yes	Yes
a	Pump Station	Yes	Yes

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
B	SELECTED REZONING OPTION	PC	WAH	TG	06/09
A	REPORT - APRIL 2008	AP	WAH	TG	04/09

	Name	Date
SURVEYED		
DESIGNED	W.HODSON	12/08
DESIGN CHECK	DY	12/08
DRAWN	P.CHILTON	04/09
DRAWING CHECK	W.HODSON	04/09
APPROVED	TG	04/09

MWH

HASTINGS DISTRICT COUNCIL

HASTINGS DISTRICT COUNCIL
IRONGATE INDUSTRIAL PLAN CHANGE

WATER AND WASTEWATER SERVICES
WASTEWATER – CONCEPT DESIGN – SELECTED REZONING OPTION

Status Stamp: PRELIMINARY
Date Stamp: 16/06/2009
SCALES (A1) NTS
Drawing No.: Z1462302
Sheet No.: C103
Rev.: B

XREFS:

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DO NOT SCALE – IF IN DOUBT, ASK

ORIGINAL SIZE A1

Water										
		Option 1 (1st)	Option 1 (2nd)	Option 2 (1st)	Option 2 (2nd)	Option 3 (1st)	Option 3 (2nd)	Option 4 (1st)	Option 4 (2nd)	Option 5
	Area Serviced (ha)	34.3	38.2	51.6	38.2	48.5	38.2	72.1	38.2	110.3
	Areas Serviced	Stage 1 GF	+ Stage 2	Stage 1 All	+ Stage 2	Stage 1 GF, a & b	+ Stage 2	Stage 1 All, a, b & c.	+ Stage 2	All Areas
Section	Length (m)									
a-b	80	150 dia & 200 dia	ok	150 dia & 250 dia	ok	150 dia & 200 dia	ok	150 dia & 250 dia	ok	150 dia & 250 dia
b-c	220	-	-	150 dia & 250 dia	ok	-	-	150 dia & 250 dia	ok	150 dia & 250 dia
c-d	220	-	-	150 dia & 200 dia	ok	-	-	150 dia & 200 dia	ok	150 dia & 200 dia
d-e	50	-	-	-	-	-	-	200 dia	ok	200 dia
a-f	240	150 dia & 300 dia	ok	150 dia & 300 dia	ok	150 dia & 300 dia	ok	150 dia & 300 dia	ok	150 dia & 300 dia
f-g	490	300 dia	150 dia	300 dia	150 dia	300 dia	150 dia	300 dia	150 dia	150 dia & 300 dia
a-h	100	-	-	-	-	150 dia & 200 dia	ok	150 dia & 200 dia	ok	150 dia & 200 dia
g-i	2300	300 dia	ok	300 dia	ok	300 dia	ok	300 dia	ok	300 dia
a-k	2500	-	-	-	-	-	-	-	-	-
k-m	550	-	-	-	-	-	-	-	-	-
k	Discharge Treat	-	-	-	-	-	-	-	-	-
a	Pump Station	-	-	-	-	-	-	-	-	-
d	Pump Station	-	-	-	-	-	-	-	-	-
Dia										
100mm Watermain	Length (m)									
150mm Watermain	Length (m)	320	490	760	490	420	490	860	490	1350
200mm Watermain	Length (m)	80	0	220	0	180	0	370	0	270
250mm Watermain	Length (m)	0	0	300	0	0	0	300	0	300
300mm Watermain	Length (m)	3030	0	3030	0	3030	0	3030	0	3030
150mm Valve	No.	6	3	10	3	9	3	15	3	18
200mm Valve	No.	2	0	3	0	5	0	6	0	6
250mm Valve	No.	0	0	3	0	0	0	3	0	3
300mm Valve	No.	6	0	6	0	6	0	6	0	6
100mm Watermain	$140	$0	$0	$0	$0	$0	$0	$0	$0	$0
150mm Watermain	$210	$67,200	$102,900	$159,600	$102,900	$88,200	$102,900	$180,600	$102,900	$283,500
200mm Watermain	$250	$20,000	$0	$55,000	$0	$45,000	$0	$92,500	$0	$67,500
250mm Watermain	$300	$0	$0	$90,000	$0	$0	$0	$90,000	$0	$90,000
300mm Watermain	$400	$1,212,000	$0	$1,212,000	$0	$1,212,000	$0	$1,212,000	$0	$1,212,000
Hydrant (100m spacing)	$1,500	$9,600	$14,700	$22,800	$14,700	$12,600	$14,700	$25,800	$14,700	$40,500
Stream Crossing	$0	$0	$0	$0	$0	$20,000	$0	$20,000	$0	$20,000
150mm Valve	$2,200	$13,200	$6,600	$22,000	$6,600	$19,800	$6,600	$33,000	$6,600	$39,600
200mm Valve	$3,000	$6,000	$0	$9,000	$0	$15,000	$0	$18,000	$0	$18,000
250mm Valve	$5,500	$0	$0	$16,500	$0	$0	$0	$16,500	$0	$16,500
300mm Valve	$6,500	$39,000	$0	$39,000	$0	$39,000	$0	$39,000	$0	$39,000
Reservoir Storage Contribution (1 days storage)	$7,000	$120,050	$133,700	$180,600	$133,700	$169,750	$133,700	$252,350	$133,700	$386,050
Upgrade Flaxmere Bore	$250,000	$250,000	$0	$250,000	$0	$250,000	$0	$250,000	$0	$250,000
Subtotal		$1,737,050	$257,900	$2,056,500	$257,900	$1,871,350	$257,900	$2,229,750	$257,900	$2,462,650
P&G allowance (10%)		$173,705	$25,790	$205,650	$25,790	$187,135	$25,790	$222,975	$25,790	$246,265
Engineering (15%)		$286,613	$42,554	$339,323	$42,554	$308,773	$42,554	$367,909	$42,554	$406,337
Contingency (25%)		$549,342	$81,561	$650,368	$81,561	$591,814	$81,561	$705,158	$81,561	$778,813
TOTAL		**$2,750,000**	**$410,000**	**$3,250,000**	**$410,000**	**$2,960,000**	**$410,000**	**$3,530,000**	**$410,000**	**$3,890,000**
Onsite Costs (Developer/ Property Owner)										
Main (150mm) along Internal Roa	$6,500	$222,950	$248,300	$335,400	$248,300	$315,250	$248,300	$468,650	$248,300	$716,950
Laterals (150mm dia)	$2,500	$85,750	$95,500	$129,000	$95,500	$121,250	$95,500	$180,250	$95,500	$275,750
Subtotal		$308,700	$343,800	$464,400	$343,800	$436,500	$343,800	$648,900	$343,800	$992,700
P&G allowance (10%)		$30,870	$34,380	$46,440	$34,380	$43,650	$34,380	$64,890	$34,380	$99,270
Engineering (15%)		$50,936	$56,727	$76,626	$56,727	$72,023	$56,727	$107,069	$56,727	$163,796
Contingency (25%)		$97,626	$108,727	$146,867	$108,727	$138,043	$108,727	$205,215	$108,727	$313,941
TOTAL (Initial)		**$490,000**	**$540,000**	**$730,000**	**$540,000**	**$690,000**	**$540,000**	**$1,030,000**	**$540,000**	**$1,570,000**
Area a						$60,000		$60,000		
Area b						$150,000		$150,000		
Area c						-		$70,000		

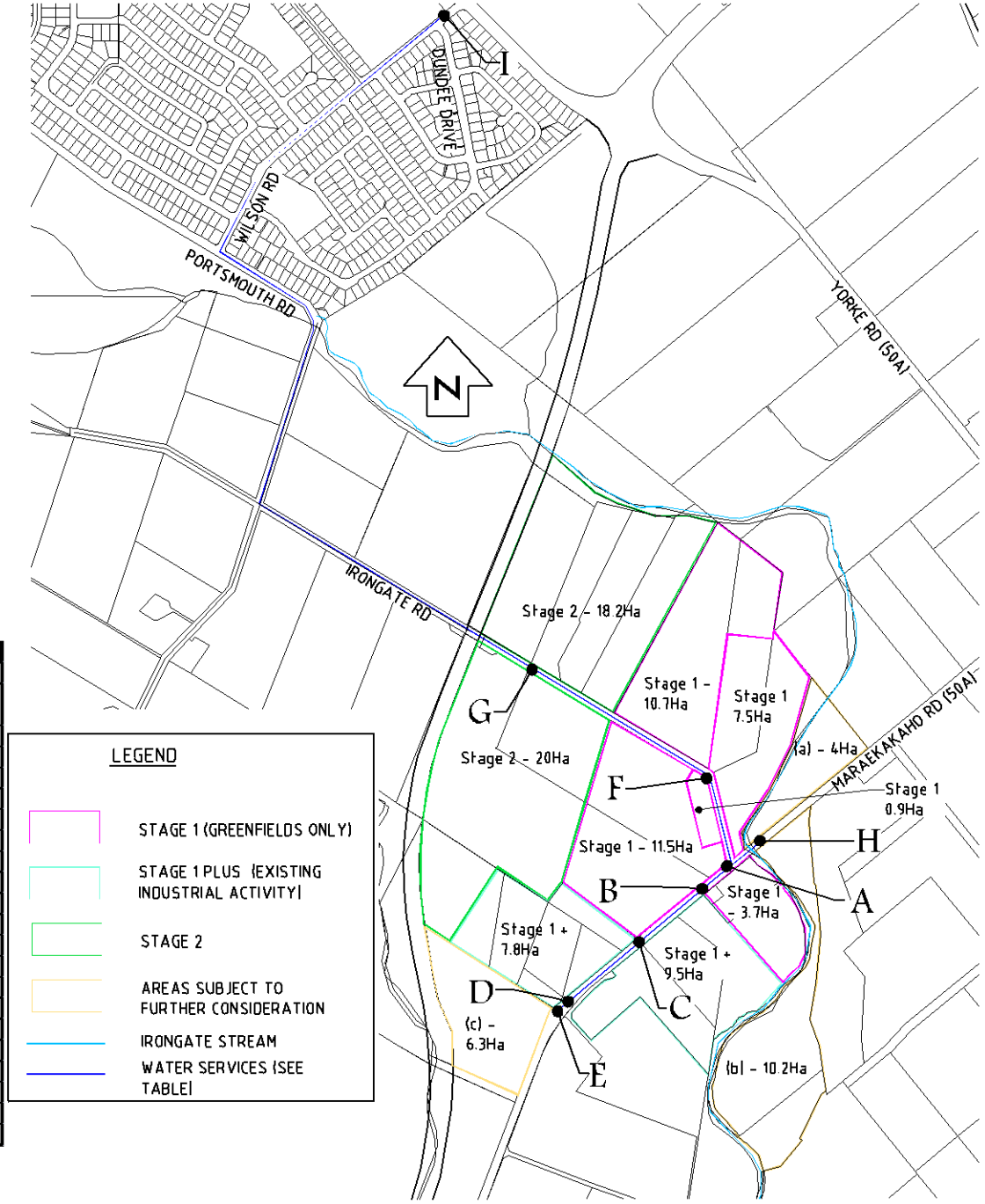
Wastewater - Gravity System

		Option 1 (1st)	Option 1 (2nd)	Option 2 (1st)	Option 2 (2nd)	Option 3 (1st)	Option 3 (2nd)	Option 4 (1st)	Option 4 (2nd)	Option 5
	Area Serviced (ha)	34.3	38.2	51.6	38.2	48.5	38.2	72.1	38.2	110.3
	Areas Serviced	Stage 1 GF	+ Stage 2	Stage 1 All	+ Stage 2	Stage 1 GF, a & b	+ Stage 2	Stage 1 All, a, b & c.	+ Stage 2	All Areas
Section	Length (m)									
a-b	80	150 dia	ok	225 dia	ok	150 dia	ok	225 dia	ok	225 dia
b-c	220	-	-	225 dia	ok	-	-	225 dia	ok	225 dia
c-d	220	-	-	150 dia	ok	-	-	150 dia	ok	150 dia
d-e	50	-	-	-	ok	-	-	150 dia	ok	150 dia
a-f	240	225 dia	-	225 dia	ok	225 dia	ok	225 dia	ok	225 dia
f-g	490	-	225 dia	-	225 dia	-	225 dia	-	225 dia	225 dia
a-h	100	-	-	-	-	150 dia	ok	150 dia	ok	150 dia
g-i	2300	-	-	-	-	-	-	-	-	-
a-k	2500	twin 150 dia	+150 dia	twin 150 dia	+150 dia	twin 150 dia	+150 dia	twin 200 dia	ok	twin 200 dia
k-m	550	225 dia	+150 dia	225 dia	+225 dia	225 dia	+225 dia	300 dia	ok	300 dia
k	Discharge Treat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
a	Pump Station	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
d	Pump Station	-	-	-	-	-	-	Yes	ok	Yes
Dia										
100mm	Length (m)									
150mm	Length (m)	80	550	220	0	180		370		370
225mm	Length (m)	790	730	1090	1040	790	1040	540	490	1030
300mm	Length (m)							550		550
375mm	Length (m)									
Rising Main (100mm)										
Rising Main (150mm)			2500		2500		2500			
Rising Main (200mm)										
Rising Main (twin 150mm)		2500		2500		2500				
Rising Main (twin 200mm)								2500		2500
100mm	$150	$0	$0	$0	$0	$0	$0	$0	$0	$0
150mm	$205	$16,400	$112,750	$45,100	$0	$36,900	$0	$75,850	$0	$75,850
225mm	$235	$185,650	$171,550	$256,150	$244,400	$185,650	$244,400	$126,900	$115,150	$242,050
300mm	$300	$0	$0	$0	$0	$0	$0	$165,000	$0	$165,000
375mm	$325	$0	$0	$0	$0	$0	$0	$0	$0	$0
Manhole (90m spacing)	$3,500	$33,833	$49,778	$50,944	$40,444	$37,722	$40,444	$56,778	$19,056	$75,833
Stream Crossing		$10,000	$10,000	$10,000	$10,000	$20,000	$10,000	$20,000	$10,000	$20,000
Pump Station - Small	$100,000	$0						$100,000		$100,000
Pump Station - Medium	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000
Pump Station - large	$1,000,000									
Land Purchase - Pump Station	$50,000	$50,000	$0	$50,000	$0	$50,000	$0	$50,000	$0	$50,000
Rising Main (100mm)	$150	$0	$0	$0	$0	$0	$0	$0	$0	$0
Rising Main (150mm)	$210	$0	$525,000	$0	$525,000	$0	$525,000	$0	$0	$0
Rising Main (200mm)	$250	$0	$0	$0	$0	$0	$0	$0	$0	$0
Rising Main (twin 150mm)	$300	$750,000	$0	$750,000	$0	$750,000	$0	$0	$0	$0
Rising Main (twin 200mm)	$360	$0	$0	$0	$0	$0	$0	$900,000	$0	$900,000
Rising Main Discharge Vent / Trea	$50,000	$50,000	$25,000	$75,000	$50,000	$65,000	$50,000	$100,000	$50,000	$100,000
Other										
Subtotal		$1,345,883	$1,144,078	$1,487,194	$1,119,844	$1,395,272	$1,119,844	$1,844,528	$444,206	$1,978,733
P&G allowance (10%)		$134,588	$114,408	$148,719	$111,984	$139,527	$111,984	$184,453	$44,421	$197,873
Engineering (15%)		$222,071	$188,773	$245,387	$184,774	$230,220	$184,774	$304,347	$73,294	$326,491
Contingency (25%)		$425,636	$361,815	$470,325	$354,151	$441,255	$354,151	$583,332	$140,480	$625,774
TOTAL (Initial)		**$2,130,000**	**$1,810,000**	**$2,350,000**	**$1,770,000**	**$2,210,000**	**$1,770,000**	**$2,920,000**	**$700,000**	**$3,130,000**
		1.582603742								
Onsite Costs (Developer/ Property Owner)										
New Sewer along Internal Roads	$6,000	$205,800	$229,200	$309,600	$229,200	$291,000	$229,200	$432,600	$229,200	$661,800
Sewer Laterals (150mm dia)	$7,500	$257,250	$286,500	$387,000	$286,500	$363,750	$286,500	$540,750	$286,500	$827,250
Pump Stations (low areas)	$4,000	$137,200	$152,800	$206,400	$152,800	$194,000	$152,800	$288,400	$152,800	$441,200
Subtotal		$600,250	$668,500	$903,000	$668,500	$848,750	$668,500	$1,261,750	$668,500	$1,930,250
P&G allowance (10%)		$60,025	$66,850	$90,300	$66,850	$84,875	$66,850	$126,175	$66,850	$193,025
Engineering (15%)		$99,041	$110,303	$148,995	$110,303	$140,044	$110,303	$208,189	$110,303	$318,491
Contingency (25%)		$189,829	$211,413	$285,574	$211,413	$268,417	$211,413	$399,028	$211,413	$610,442
TOTAL (Initial)		**$950,000**	**$1,060,000**	**$1,430,000**	**$1,060,000**	**$1,340,000**	**$1,060,000**	**$2,000,000**	**$1,060,000**	**$3,050,000**
Area a						$22,535		$78,327		
Area b						$57,465		$199,734		
Area c						-		$291,939		
Area a						**$20,000**		**$80,000**		
Area b						**$60,000**		**$200,000**		
Area c								**$290,000**		

Wastewater - Pressure System										
		Option 1 (1st)	Option 1 (2nd)	Option 2 (1st)	Option 2 (2nd)	Option 3 (1st)	Option 3 (2nd)	Option 4 (1st)	Option 4 (2nd)	Option 5
	Area Serviced (ha)	34.3	38.2	51.6	38.2	48.5	38.2	72.1	38.2	110.3
	Areas Serviced	Stage 1 GF	+ Stage 2	Stage 1 All	+ Stage 2	Stage 1 GF, a & b	+ Stage 2	Stage 1 All, a, b & c.	+ Stage 2	All Areas
Section	Length (m)									
a-b	80	50 dia	ok	80 dia	ok	50 dia	ok	100 dia	ok	100 dia
b-c	220	-	-	80 dia	ok	-	-	80 dia	ok	80 dia
c-d	220	-	-	50 dia	ok	-	-	65 dia	ok	65 dia
d-e	50	-	-	-	ok	-	-	50 dia	ok	50 dia
a-f	240	80 dia	+100 dia	80 dia	+100 dia	80 dia	+100 dia	80 dia	+100 dia	150 dia
f-g	490	-	100 dia	-	100 dia	-	100 dia	-	100 dia	100 dia
a-h	100	-	-	-	-	65 dia	ok	65 dia	ok	65 dia
g-i	2300	-	-	-	-	-	-	-	-	-
a-k	2500	150 dia	+150 dia	twin 150 dia	+100 dia	twin 150 dia	+100 dia	twin 150 dia	+100 dia	twin 200 dia
k-m	550	225 dia	ok	225 dia	+150 dia	225 dia	+150 dia	225 dia	+150 dia	300 dia
k	Discharge Treat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
a	Pump Station	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
d	Pump Station	-	-	-	-	-	-	-	-	-
Dia										
150mm - Gravity	Length (m)	0	0	0	550	0	550	0	550	0
225mm - Gravity	Length (m)	550	0	550	0	550	0	550	0	0
300mm - Gravity	Length (m)	0	0	0	0	0	0	0	0	550
50mm - Pressure Sewer	Length (m)	80	0	220	0	80	0	50	0	50
65mm - Pressure Sewer	Length (m)	0	0	0	0	100	0	320	0	320
80mm - Pressure Sewer	Length (m)	240	0	540	0	240	0	460	0	220
100mm - Pressure Sewer	Length (m)	0	730	0	3230	0	3230	80	3230	570
150mm - Pressure Sewer/Rising M	Length (m)	2500	2500	0	0	0	0	0	0	240
Twin 150mm - Rising Main	Length (m)	0	0	2500	0	2500	0	2500	0	0
200mm - Rising Main	Length (m)	0	0	0	0	0	0	0	0	0
Twin 200mm - Rising Main	Length (m)	0	0	0	0	0	0	0	0	2500
Valves	No.	5	15	10	15	10	15	20	15	25
150mm - Gravity	$205	$0	$0	$0	$0	$112,750	$0	$112,750	$0	$112,750	$0
225mm - Gravity	$235	$129,250	$0	$129,250	$0	$129,250	$0	$129,250	$0	$0
300mm - Gravity	$300	$0	$0	$0	$0	$0	$0	$0	$0	$165,000
50mm - Pressure Sewer	$90	$7,200	$0	$19,800	$0	$7,200	$0	$4,500	$0	$4,500
65mm - Pressure Sewer	$110	$0	$0	$0	$0	$11,000	$0	$35,200	$0	$35,200
80mm - Pressure Sewer	$130	$31,200	$0	$70,200	$0	$31,200	$0	$59,800	$0	$28,600
100mm - Pressure Sewer	$150	$0	$109,500	$0	$484,500	$0	$484,500	$12,000	$484,500	$85,500
150mm - Pressure Sewer	$210	$525,000	$525,000	$0	$0	$0	$0	$0	$0	$50,400
Twin 150mm - Rising Main	$300	$0	$0	$750,000	$0	$750,000	$0	$750,000	$0	$0
200mm - Rising Main	$250	$0	$0	$0	$0	$0	$0	$0	$0	$0
Twin 200mm - Rising Main	$360	$0	$0	$0	$0	$0	$0	$0	$0	$900,000
Valves	$1,500	$7,500	$22,500	$15,000	$22,500	$15,000	$22,500	$30,000	$22,500	$37,500
Manhole (90m spacing)	$3,500	$21,389	$0	$21,389	$21,389	$21,389	$21,389	$21,389	$21,389	$21,389
Stream Crossing		$10,000	$10,000	$10,000	$10,000	$20,000	$10,000	$30,000	$10,000	$30,000
Pump Station - Small	$100,000	$100,000			$100,000	$150,000	$100,000	$100,000	$100,000	$100,000
Pump Station - Medium	$250,000		$250,000	$250,000				$250,000		$250,000
Pump Station - large	$1,000,000									
Land Purchase - Pump Station	$50,000	$50,000	$0	$50,000	$0	$50,000	$0	$50,000	$0	$50,000
Rising Main Discharge Vent / Trea	$50,000	$75,000	$25,000	$100,000	$50,000	$90,000	$50,000	$125,000	$50,000	$125,000
Other										
Subtotal		$820,089	$942,000	$1,266,589	$688,389	$1,138,589	$688,389	$1,463,389	$688,389	$1,713,589
P&G allowance (10%)		$82,009	$94,200	$126,659	$68,839	$113,859	$68,839	$146,339	$68,839	$171,359
Engineering (15%)		$135,315	$155,430	$208,987	$113,584	$187,867	$113,584	$241,459	$113,584	$282,742
Contingency (25%)		$259,353	$297,908	$400,559	$217,703	$360,079	$217,703	$462,797	$217,703	$541,922
TOTAL (Initial)		**$1,300,000**	**$1,490,000**	**$2,000,000**	**$1,090,000**	**$1,800,000**	**$1,090,000**	**$2,310,000**	**$1,090,000**	**$2,710,000**
TOTAL (Both Initial and Future Phases)										
Onsite Costs (Developer/ Property Owner)										
New Sewer along Internal Roads	$2,000	$68,600	$76,400	$103,200	$76,400	$97,000	$76,400	$144,200	$76,400	$220,600
Sewer Laterals (50mm dia)	$3,000	$102,900	$114,600	$154,800	$114,600	$145,500	$114,600	$216,300	$114,600	$330,900
Pump Stations (Grinder Pumps)	$10,000	$343,000	$382,000	$516,000	$382,000	$485,000	$382,000	$721,000	$382,000	$1,103,000
Subtotal		$514,500	$573,000	$774,000	$573,000	$727,500	$573,000	$1,081,500	$573,000	$1,654,500
P&G allowance (10%)		$51,450	$57,300	$77,400	$57,300	$72,750	$57,300	$108,150	$57,300	$165,450
Engineering (15%)		$84,893	$94,545	$127,710	$94,545	$120,038	$94,545	$178,448	$94,545	$272,993
Contingency (25%)		$162,711	$181,211	$244,778	$181,211	$230,072	$181,211	$342,024	$181,211	$523,236
TOTAL (Initial)		**$810,000**	**$910,000**	**$1,220,000**	**$910,000**	**$1,150,000**	**$910,000**	**$1,710,000**	**$910,000**	**$2,620,000**
Area a						$140,845		$35,432		
Area b						$359,155		$90,353		
Area c						-		$184,215		
Area a						**$140,000**		**$40,000**		
Area b						**$360,000**		**$90,000**		
Area c								**$180,000**		

Water					
		Option 1		Option 2	
	Area Serviced (ha)	34.3	38.2	51.6	38.2
	Areas Serviced	Stage 1 GF	+ Stage 2	Stage 1 All	+ Stage 2
Section	Length (m)				
a-b	80	150 dia & 200 dia	ok	150 dia & 250 dia	ok
b-c	220	-	-	150 dia & 250 dia	ok
c-d	220	-	-	150 dia & 200 dia	ok
d-e	50	-	-	-	-
a-f	240	150 dia & 300 dia	ok	150 dia & 300 dia	ok
f-g	490	300 dia	150 dia	300 dia	150 dia
a-h	100	-	-	-	-
g-i	2300	300 dia	ok	300 dia	ok
a-k	2500	-	-	-	-
k-m	550	-	-	-	-
k	Discharge Treat	-	-	-	-
a	Pump Station	-	-	-	-
d	Pump Station	-	-	-	-

		Option 3		Option 4		Option 5
	Area Serviced (ha)	48.5	38.2	72.1	38.2	110.3
	Areas Serviced	Stage 1 GF, a & b	+ Stage 2	Stage 1 All, a, b & c.	+ Stage 2	All Areas
Section	Length (m)					
a-b	80	150 dia & 200 dia	ok	150 dia & 250 dia	ok	150 dia & 250 dia
b-c	220	-	-	150 dia & 250 dia	ok	150 dia & 250 dia
c-d	220	-	-	150 dia & 200 dia	ok	150 dia & 200 dia
d-e	50	-	-	200 dia	ok	200 dia
a-f	240	150 dia & 300 dia	ok	150 dia & 300 dia	ok	150 dia & 300 dia
f-g	490	300 dia	150 dia	300 dia	150 dia	150 dia & 300 dia
a-h	100	150 dia & 200 dia	ok	150 dia & 200 dia	ok	150 dia & 200 dia
g-i	2300	300 dia	ok	300 dia	ok	300 dia
a-k	2500	-	-	-	-	-
k-m	550	-	-	-	-	-
k	Discharge Treat	-	-	-	-	-
a	Pump Station	-	-	-	-	-
d	Pump Station	-	-	-	-	-



REV	REVISIONS	AP DRAWN	WAH CHECKED	TG APPROVED	04/09 DATE
A	REPORT - APRIL 2009				

	Name	Date
SURVEYED		
DESIGNED	W.HODGSON	12/08
DESIGN CHECK	DY	12/08
DRAWN	P.CHALTON	04/09
DRAWING CHECK	W.HODGSON	04/09
APPROVED	TG	04/09

MWH

HASTINGS DISTRICT COUNCIL

HASTINGS DISTRICT COUNCIL
IRONGATE INDUSTRIAL PLAN CHANGE

WATER AND WASTEWATER SERVICES
WATER - CONCEPT DESIGN

Status Stamp: PRELIMINARY
Date Stamp: 12/05/2009
SCALES (A1) NTS
Drawing No.: Z1462302
Sheet No.: C102
Rev.: A

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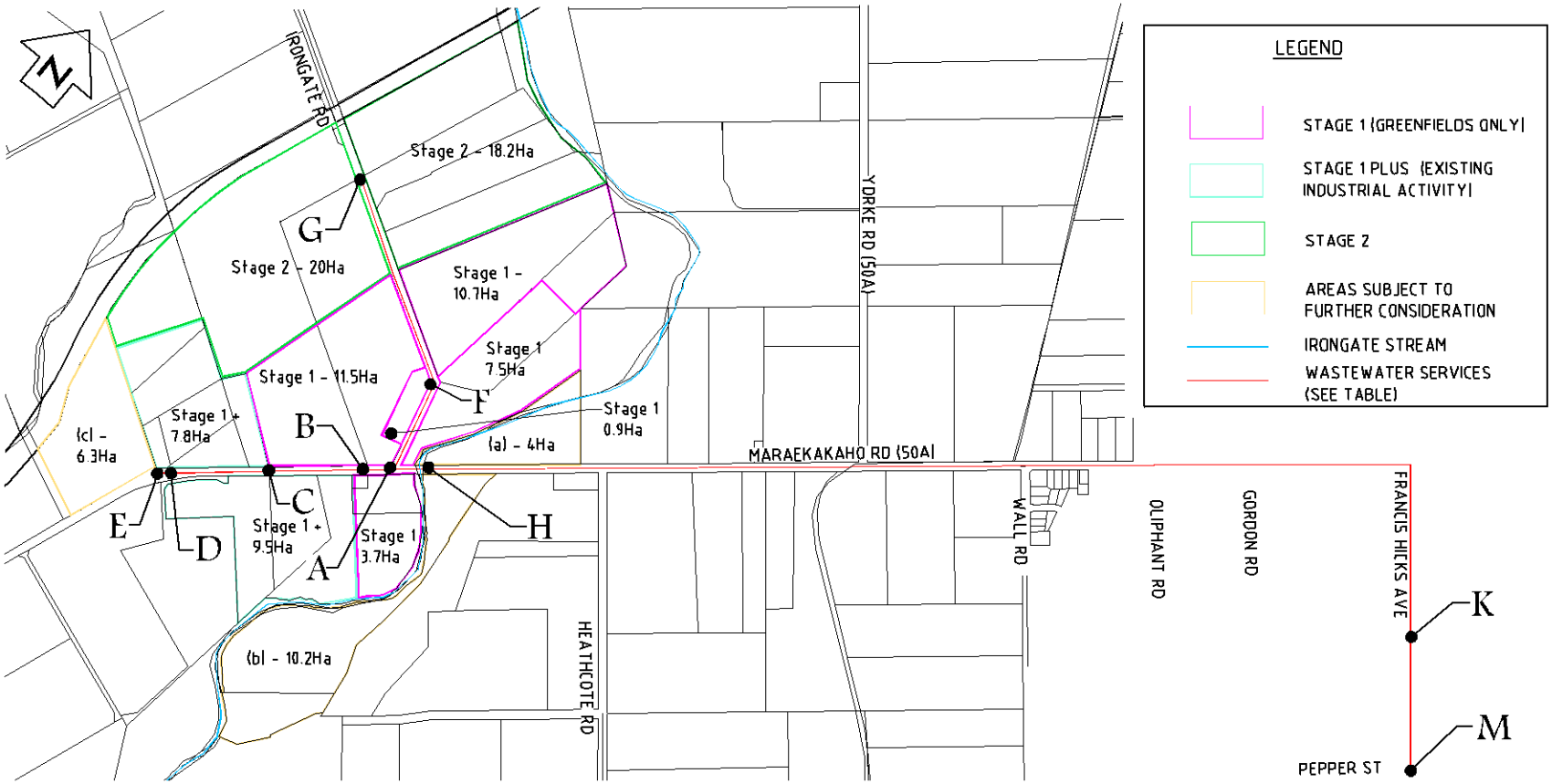

Wastewater - Gravity System

		Option 1		Option 2		Option 3		Option 4		Option 5
	Area Serviced (ha)	34.3	38.2	51.6	38.2	48.5	38.2	72.1	38.2	110.3
	Areas Serviced	Stage 1 GF	+ Stage 2	Stage 1 All	+ Stage 2	Stage 1 GF, a & b	+ Stage 2	Stage 1 All, a, b & c.	+ Stage 2	All Areas
Section	Length (m)									
a-b	80	150 dia	ok	225 dia	ok	150 dia	ok	225 dia	ok	225 dia
b-c	220	-	-	225 dia	ok	-	-	225 dia	ok	225 dia
c-d	220	-	-	150 dia	ok	-	-	150 dia	ok	150 dia
d-e	50	-	-	-	ok	-	-	150 dia	ok	150 dia
a-f	240	225 dia	-	225 dia	ok	225 dia	ok	225 dia	ok	225 dia
f-g	490	-	225 dia	-	225 dia	-	225 dia	-	225 dia	225 dia
a-h	100	-	-	-	-	150 dia	ok	150 dia	ok	150 dia
g-i	2300	-	-	-	-	-	-	-	-	-
a-k	2500	twin 150 dia	+150 dia	twin 150 dia	+150 dia	twin 150 dia	+150 dia	twin 200 dia	ok	twin 200 dia
k-m	550	225 dia	+150 dia	225 dia	+225 dia	225 dia	+225 dia	300 dia	ok	300 dia
k	Discharge Treat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
a	Pump Station	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
d	Pump Station	-	-	-	-	-	-	Yes	ok	Yes

Wastewater - Pressure System

		Option 1		Option 2		Option 3		Option 4		Option 5
	Area Serviced (ha)	34.3	38.2	51.6	38.2	48.5	38.2	72.1	38.2	110.3
	Areas Serviced	Stage 1 GF	+ Stage 2	Stage 1 All	+ Stage 2	Stage 1 GF, a & b	+ Stage 2	Stage 1 All, a, b & c.	+ Stage 2	All Areas
Section	Length (m)									
a-b	80	50 dia	ok	80 dia	ok	50 dia	ok	100 dia	ok	100 dia
b-c	220	-	-	80 dia	ok	-	-	80 dia	ok	80 dia
c-d	220	-	-	50 dia	ok	-	-	65 dia	ok	65 dia
d-e	50	-	-	-	ok	-	-	50 dia	ok	50 dia
a-f	240	80 dia	+100 dia	80 dia	+100 dia	80 dia	+100 dia	80 dia	+100 dia	150 dia
f-g	490	-	100 dia	-	100 dia	-	100 dia	-	100 dia	100 dia
a-h	100	-	-	-	-	65 dia	ok	65 dia	ok	65 dia
g-i	2300	-	-	-	-	-	-	-	-	-
a-k	2500	150 dia	+150 dia	twin 150 dia	+100 dia	twin 150 dia	+100 dia	twin 150 dia	+100 dia	twin 200 dia
k-m	550	225 dia	ok	225 dia	+150 dia	225 dia	+150 dia	225 dia	+150 dia	300 dia
k	Discharge Treat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
a	Pump Station	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
d	Pump Station	-	-	-	-	-	-	-	-	-

REV	REVISIONS	AP DRAWN	MAH CHECKED	TG APPROVED	01-09 DATE
A	REPORT - APRIL 2009				

	Name	Date
SURVEYED		
DESIGNED	M HOOSON	12/08
DESIGN CHECK	GY	12/08
DRAWN	P.CARLTON	04/09
DRAWING CHECK	M HOOSON	04/09
APPROVED	TG	04/09

MWH

HASTINGS DISTRICT COUNCIL

HASTINGS DISTRICT COUNCIL
IRONGATE INDUSTRIAL PLAN CHANGE

WATER AND WASTEWATER SERVICES
WASTEWATER - CONCEPT DESIGN

Status: PRELIMINARY
Date: 12/05/2009
SCALES (A1) NTS
Drawing No. Z1462302
Sheet No. C 103
Rev. A

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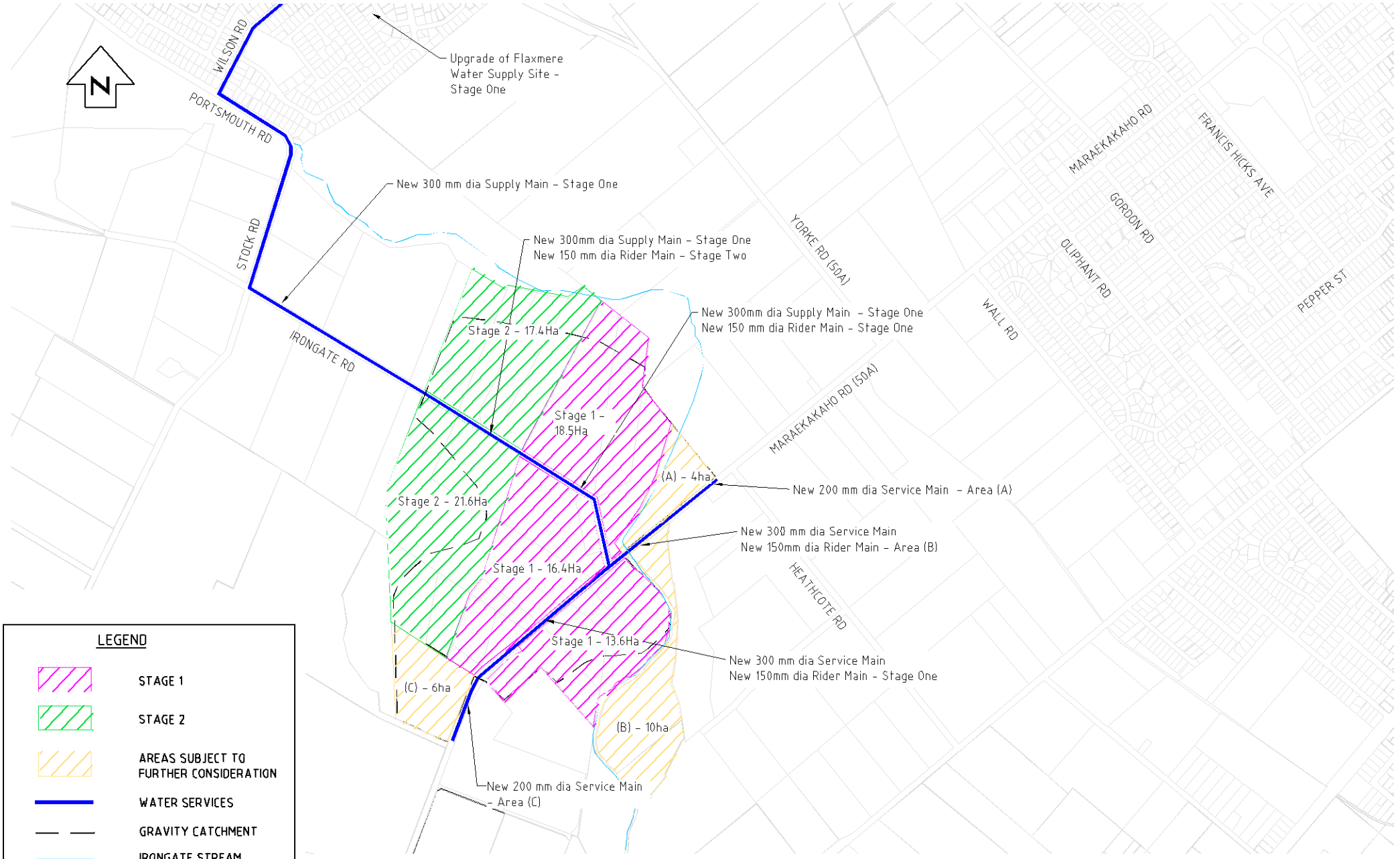

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

NOT FOR CONSTRUCTION

REV	REVISIONS	AP DRAWN	DY CHECKED	TG APPROVED	12/08 DATE
A	REPORT - DEC 2008				

	Name	Date
SURVEYED		
DESIGNED	MAH	12/08
DESIGN CHECK	DY	12/08
DRAWN	AP	12/08
DRAWING CHECK	DY	12/08
APPROVED BY P.M.	TG	12/08

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IRONGATE INDUSTRIAL PLAN CHANGE

WATER SUPPLY SERVICES

CONCEPTUAL

Drawing Date: 23/12/2008

SCALES (A1) NTS

Drawing No.: Z1462301

Sheet No.: C 01

Rev.: A

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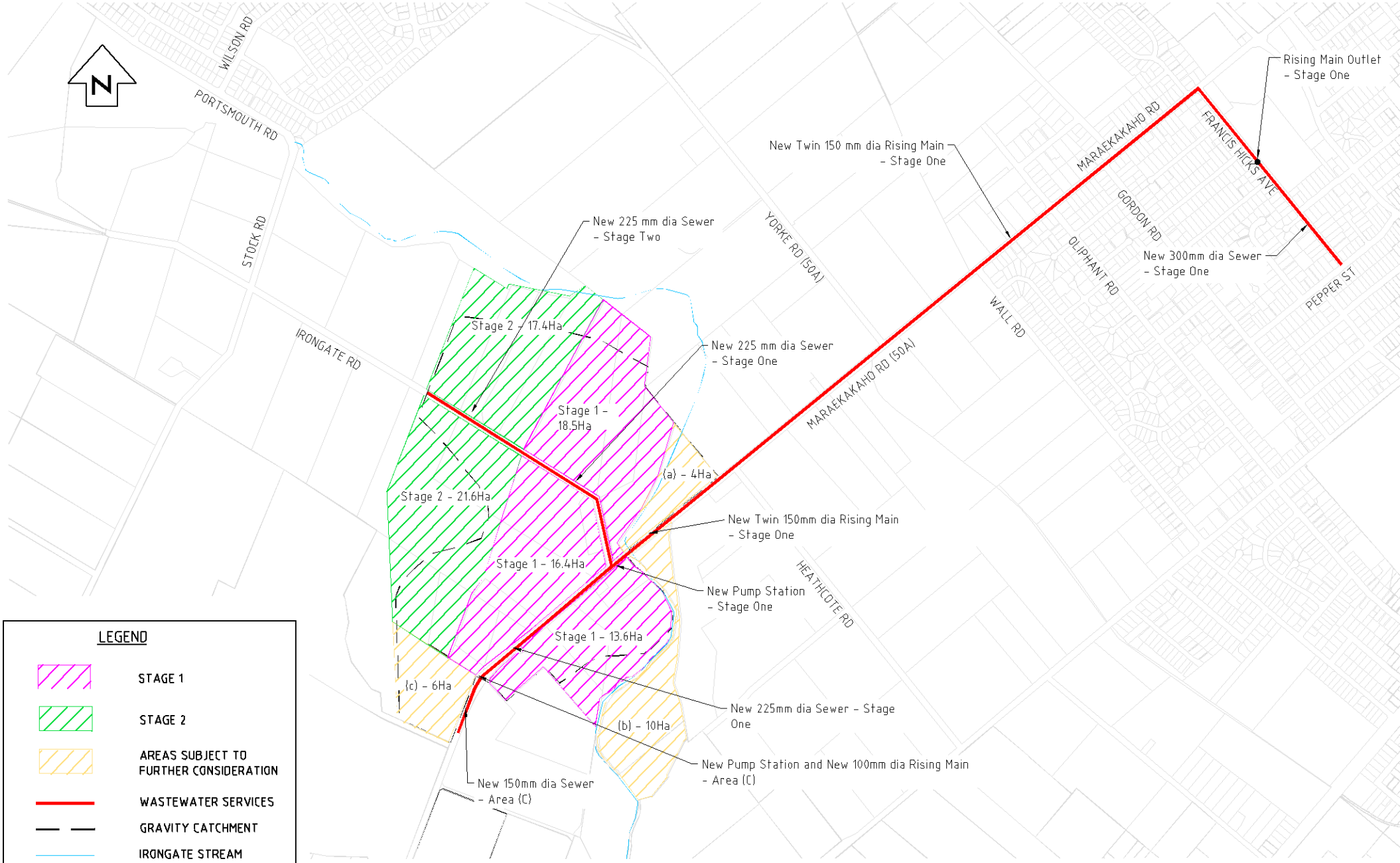

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A	REPORT - DEC 2008	AP	DY	TG	12/08

	Name	Date
SURVEYED		
DESIGNED	MAH	12/08
DESIGN CHECK	DY	12/08
DRAWN	AP	12/08
DRAWING CHECK	DY	12/08
APPROVED BY P.M.	TG	12/08

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IRONGATE INDUSTRIAL PLAN CHANGE

WASTEWATER SERVICES

Status: CONCEPTUAL
Date: 23/12/2008
SCALES (A1) NTS
Drawing No: Z1462301
Sheet No: C 02
Rev: A

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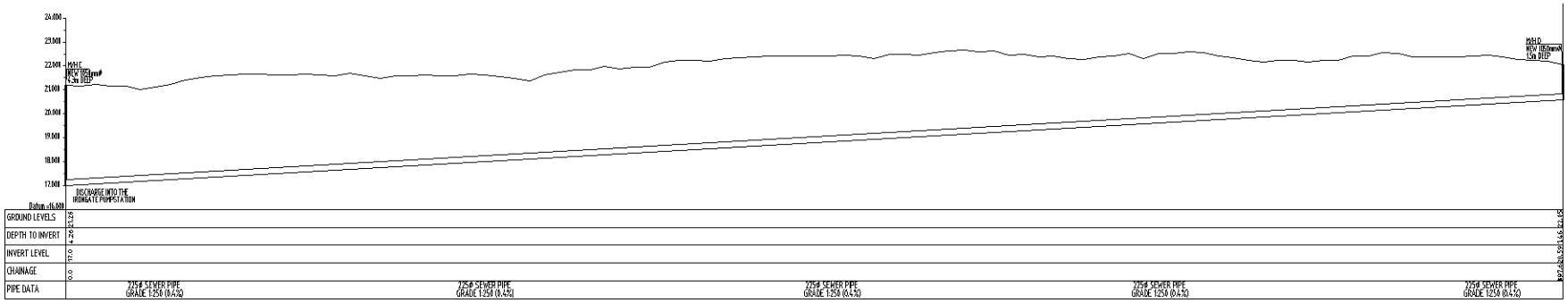
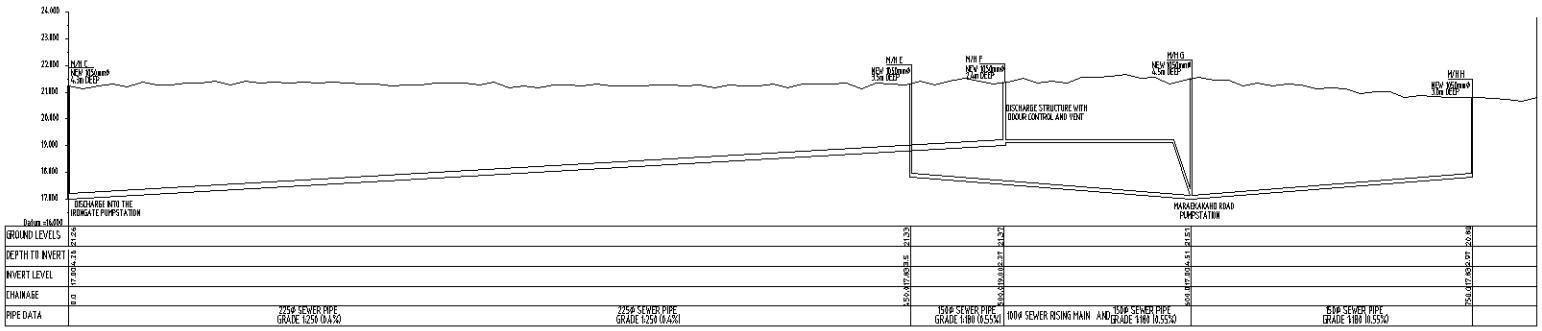


LONGSECTION ONE
MARAEKAKAHO ROAD TO EXPRESSWAY



LONGSECTION TWO
IRONGATE ROAD TO SOUTH END OF MARAEKAKAHO ROAD

NOT FOR CONSTRUCTION

REV	REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	CONCEPTUAL	AP	WAH	TG	12/08

	Name	Date
SURVEYED		
DESIGNED	WAH	12/08
DESIGN CHECK	DY	12/08
DRAWN	AP	12/08
DRAWING CHECK	DY	12/08
APPROVED BY P.M.	TG	12/08

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HASTINGS DISTRICT COUNCIL

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IRONGATE INDUSTRIAL PLAN CHANGE

CONCEPTUAL
LONGSECTIONS

Status Stamp: **CONCEPTUAL**
Date Stamp: **23/12/2008**
SCALES **(A1)** NTS
Drawing No.: Z1462302
Sheet No.: C 03
Rev.: A

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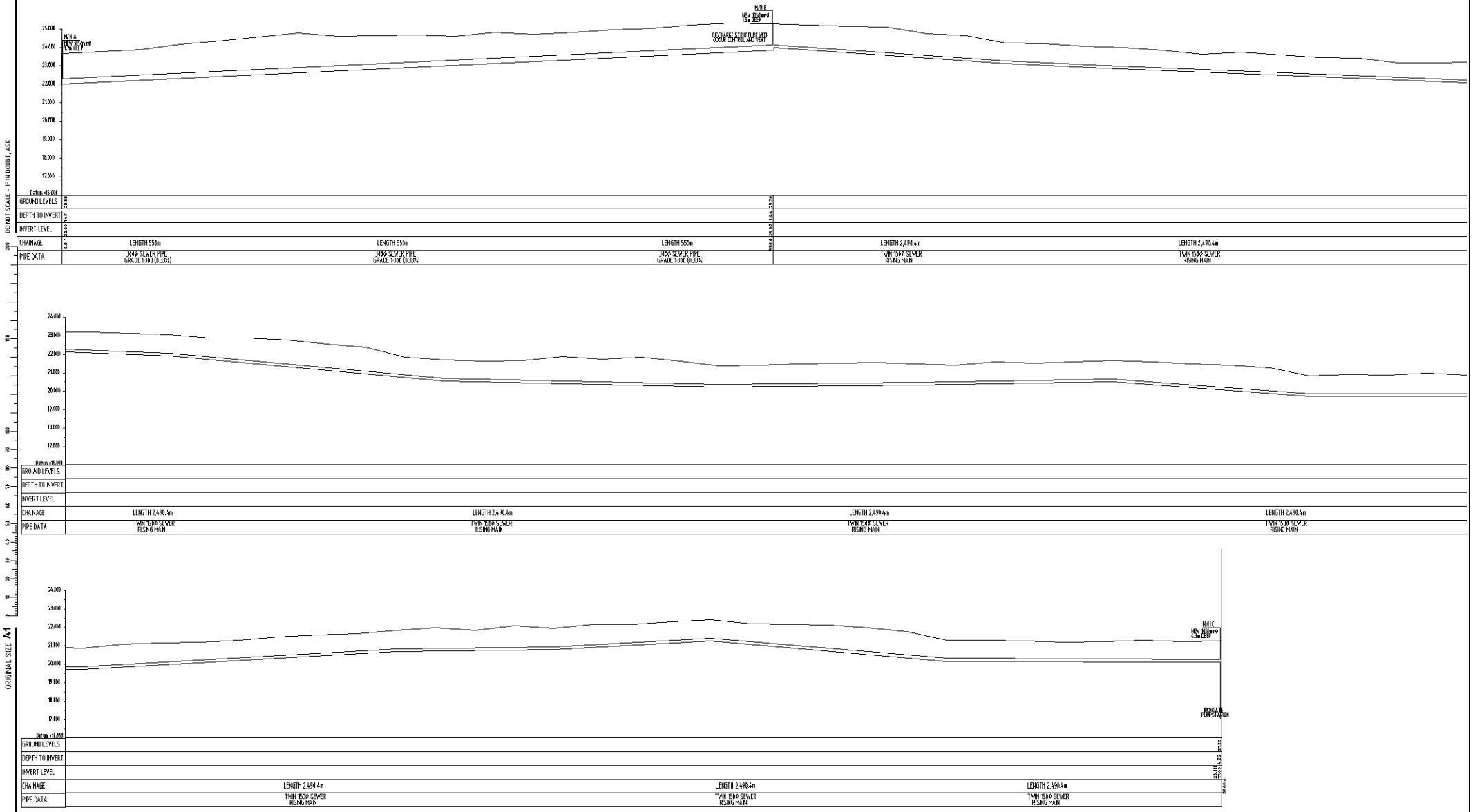

LONGSECTION THREE
PEPPER STREET TO IRONGATE ROAD

NOT FOR CONSTRUCTION

REV		REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	CONCEPTUAL		AP	WAH	TG	12/08

	Name	Date
SURVEYED		
DESIGNED	WAH	12/08
DESIGN CHECK	DY	12/08
DRAWN	AP	12/08
DRAWING CHECK	DY	12/08
APPROVED BY P.M.	TG	12/08

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HASTINGS DISTRICT COUNCIL

HASTINGS DISTRICT COUNCIL
IRONGATE INDUSTRIAL PLAN CHANGE

CONCEPTUAL
LONGSECTIONS

Status: **CONCEPTUAL**
Date: **23/12/2008**
SCALES **(A1)** NTS
Drawing No. Z1462302 | Sheet No. C 04 | Rev. A

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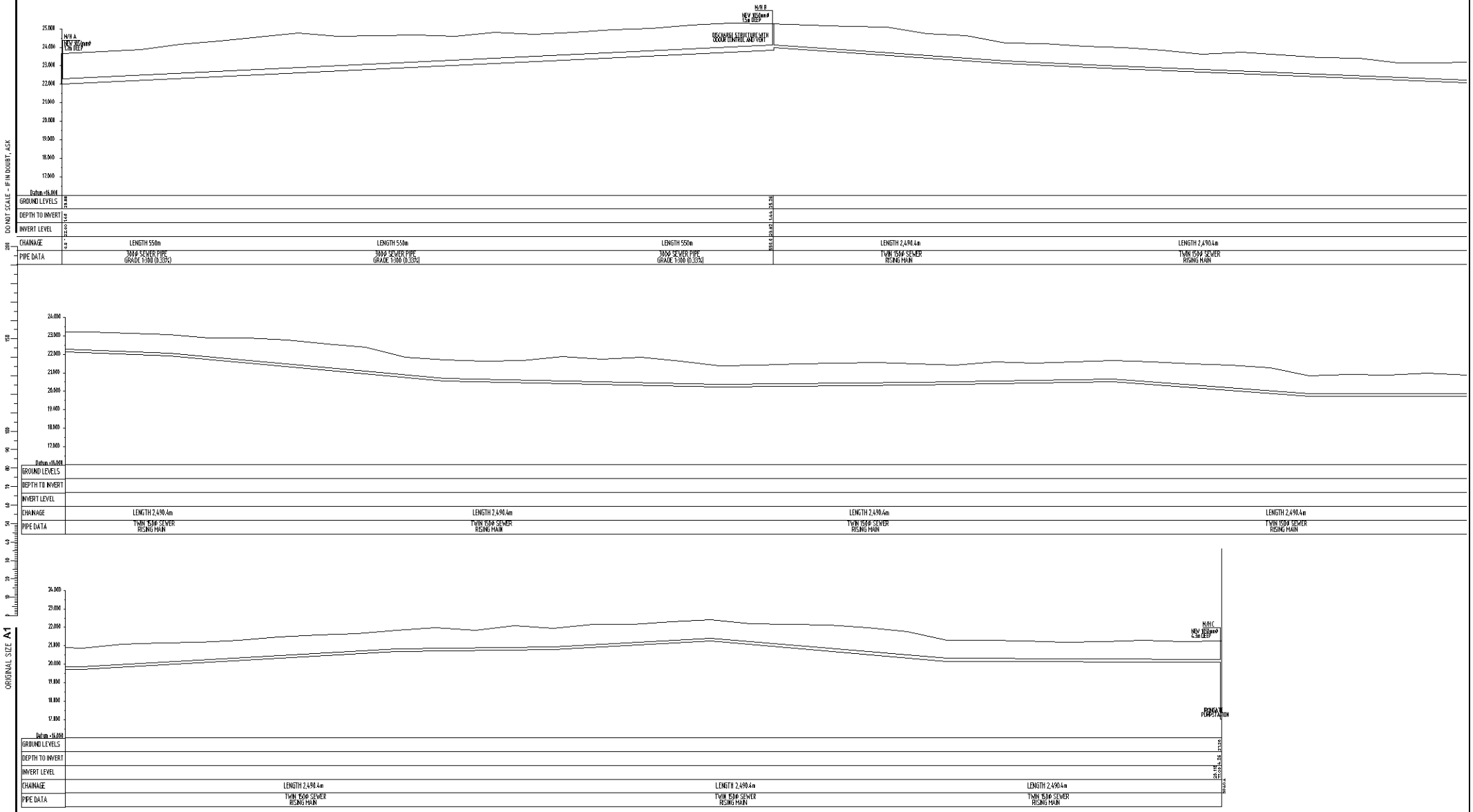
ORIGINAL SIZE A1



LONGSECTION THREE
PEPPER STREET TO IRONGATE ROAD

NOT FOR CONSTRUCTION

REV		REVISIONS	DRAWN	CHECKED	APPROVED	DATE
A	CONCEPTUAL		AP	WAH	TG	12/08

	Name	Date
SURVEYED		
DESIGNED	WAH	12/08
DESIGN CHECK	DY	12/08
DRAWN	AP	12/08
DRAWING CHECK	DY	12/08
APPROVED BY P.M.	TG	12/08

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HASTINGS DISTRICT COUNCIL

HASTINGS DISTRICT COUNCIL
IRONGATE INDUSTRIAL PLAN CHANGE

CONCEPTUAL
LONGSECTIONS

Status: **CONCEPTUAL**
Date: **23/12/2008**
SCALES **(A1)** NTS
Drawing No. Z1462302 | Sheet No. C 04 | Rev. A

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ORIGINAL SIZE A1