

**Appendix G6: Alternatives Evaluation – Potable Water Supply**

Alternative Method Design Assumptions		
Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
<ul style="list-style-type: none"> <li>• Would require the establishment of a new groundwater supply in the vicinity of the Project development area (PDA) (site not determined as part of assessment).</li> <li>• Minor surficial disturbance to the landscape to install supply infrastructure. No watercourse crossings anticipated.</li> <li>• Water taking from an appropriate aquifer would lead to effects on groundwater, but would be managed based on regulatory requirements.</li> <li>• Would require site-specific treatment to meet drinking water quality standards.</li> <li>• Standard mitigation measures would limit effects from construction such as erosion and sedimentation.</li> </ul>	<ul style="list-style-type: none"> <li>• Would require the establishment of a new surface water supply in the vicinity of the PDA, sourced from Kenogamisis Lake to limit the potential for watershed effects.</li> <li>• Minor surficial disturbance to the landscape and shoreline to install supply infrastructure. No watercourse crossings anticipated.</li> <li>• Would require site-specific treatment to meet drinking water quality standards.</li> <li>• Standard mitigation measures would limit effects from construction such as erosion and sedimentation.</li> </ul>	<ul style="list-style-type: none"> <li>• Would require the establishment of a new connection to existing water supply infrastructure.</li> <li>• Minor surficial disturbance along existing rights-of-way to install supply infrastructure. No watercourse crossings anticipated.</li> <li>• No site-specific treatment required.</li> <li>• Standard mitigation measures would limit effects from construction such as erosion and sedimentation.</li> </ul>

Alternative Method				
Valued Component (VC)/Criteria	Indicators	Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
<b>Natural Environment</b>				
Atmospheric Environment	Climate change as measured by change in greenhouse gases (GHGs)	<p><b>Construction:</b> Minor, temporary GHG emissions from drill rig for development of new groundwater wells.</p> <p><b>Operation:</b> Limited effect on GHGs because the use and maintenance of groundwater wells would not require substantial vehicle or mobile equipment use.</p> <p><b>Closure:</b> Minor, temporary GHG emissions from machinery for the decommissioning or removal of supply infrastructure.</p>	<p><b>Construction:</b> Minor, temporary GHG emissions from construction machinery to install infrastructure for a new surface water source.</p> <p><b>Operation:</b> Limited effect on GHGs because the use and maintenance of a surface water source would not require substantial vehicle or mobile equipment use.</p> <p><b>Closure:</b> Minor, temporary GHG emissions from machinery for the decommissioning or removal of supply infrastructure.</p>	<p><b>Construction:</b> Minor, temporary GHG emissions from construction machinery to connect to existing system.</p> <p><b>Operation:</b> Limited effect on GHGs because the use of the municipal water supply would not require substantial vehicle or mobile equipment use.</p> <p><b>Closure:</b> Minor, temporary GHG emissions from machinery for the decommissioning or removal of supply infrastructure.</p>
	Change in ambient air quality parameters	<p><b>Construction:</b> Minor, temporary emissions from machinery for new groundwater well installation.</p> <p><b>Operation:</b> Limited effect on ambient air quality parameters because the use and maintenance of groundwater wells would not require substantial vehicle or mobile equipment use.</p> <p><b>Closure:</b> Minor, temporary emissions from machinery for the decommissioning or removal of supply infrastructure.</p>	<p><b>Construction:</b> Minor, temporary emissions from construction machinery to establish new source.</p> <p><b>Operation:</b> Limited effect on ambient air quality parameters because the use and maintenance of a surface water source would not require substantial vehicle or mobile equipment use.</p> <p><b>Closure:</b> Minor, temporary emissions from machinery for the decommissioning or removal of supply infrastructure.</p>	<p><b>Construction:</b> Minor, temporary emissions from construction machinery to connect to existing system.</p> <p><b>Operation:</b> Limited effect on ambient air quality parameters because the use of the municipal water supply would not require substantial vehicle or mobile equipment use.</p> <p><b>Closure:</b> Minor, temporary emissions from machinery for the decommissioning or removal of supply infrastructure.</p>
<b>Overall Atmospheric Environment Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<p><b>Neutral</b></p> <p>Minor effects on the atmospheric environment can be expected from the temporary use of machinery, but considering that the type of equipment used and duration of use is similar across all alternatives, the effects are comparable across all alternatives.</p>	<p><b>Neutral</b></p> <p>Minor effects on the atmospheric environment can be expected from the temporary use of machinery, but considering that the type of equipment used and duration of use is similar across all alternatives, the effects are comparable across all alternatives.</p>	<p><b>Neutral</b></p> <p>Minor effects on the atmospheric environment can be expected from the temporary use of machinery, but considering that the type of equipment used and duration of use is similar across all alternatives, the effects are comparable across all alternatives.</p>

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Valued Component (VC)/Criteria	Indicators	Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
Acoustic Environment	Change in noise or vibration levels	<p><b>Construction:</b> Minor noise and vibration effects from construction machinery to install groundwater wells.</p> <p><b>Operation:</b> Limited effect on noise and vibration levels because the use and maintenance of the groundwater wells would not require substantial equipment use.</p> <p><b>Closure:</b> Minor noise and vibration effects from machinery for the decommissioning or removal of supply infrastructure.</p>	<p><b>Construction:</b> Minor noise and vibration effects from construction machinery to install a surface water source.</p> <p><b>Operation:</b> Limited effect on noise and vibration levels because the use and maintenance of a surface water source would not require substantial equipment use.</p> <p><b>Closure:</b> Minor noise and vibration effects from machinery for the decommissioning or removal of supply infrastructure.</p>	<p><b>Construction:</b> Minor noise and vibration effects from construction machinery to install a connection to the existing system.</p> <p><b>Operation:</b> Limited effect on noise and vibration levels parameters because the use of the municipal water supply would not require substantial equipment use.</p> <p><b>Closure:</b> Minor noise and vibration effects from machinery for the decommissioning or removal of supply infrastructure.</p>
<p><b>Overall Acoustic Environment Ranking</b>  <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i></p>		<p><b>Neutral</b>                      Minor effects on the acoustic environment can be expected from the temporary use of machinery, but considering that the type of equipment used and duration of use is similar across all alternatives, the effects are comparable across all alternatives.</p>	<p><b>Neutral</b>                      Minor effects on the acoustic environment can be expected from the temporary use of machinery, but considering that the type of equipment used and duration of use is similar across all alternatives, the effects are comparable across all alternatives.</p>	<p><b>Neutral</b>                      Minor effects on the acoustic environment can be expected from the temporary use of machinery, but considering that the type of equipment used and duration of use is similar across all alternatives, the effects are comparable across all alternatives.</p>
Groundwater	Change in groundwater quantity or flow	<p><b>Construction:</b> Limited effect on groundwater quantity and flow anticipated because the installation of groundwater wells would not require water taking; however, water taking would begin in the construction phase, following installation.</p> <p><b>Operation:</b> Potential for decrease in groundwater quantity and change in flow from water taking.</p> <p><b>Closure:</b> Minimal effect on groundwater quantity and flow from water taking during closure phase. No effect on groundwater quantity and flow because the decommissioning of groundwater wells would not require water taking.</p>	<p><b>Construction:</b> No effect on groundwater quantity and flow or quality anticipated because the installation of a surface water source would not interact with groundwater.</p> <p><b>Operation:</b> No effect on groundwater quantity and flow anticipated because the use and maintenance of a surface water source would not interact with groundwater.</p> <p><b>Closure:</b> No effect on groundwater quantity and flow anticipated because the decommissioning of a surface water source would not interact with groundwater.</p>	<p><b>Construction:</b> No effect on groundwater quantity and flow anticipated because the installation of a connection to the municipal supply would not require water taking other than from already approved sources able to sustainably supply the Project.</p> <p><b>Operation:</b> No effect on groundwater quantity and flow anticipated because the use of the municipal source would not interact with groundwater.</p> <p><b>Closure:</b> No effect on groundwater quantity and flow anticipated because the decommissioning of a connection to the municipal supply would not interact with groundwater.</p>
	Change in groundwater quality	<p><b>Construction:</b> No effect on groundwater quality anticipated because the installation of groundwater wells would not be a source of parameters of potential concern (i.e., metals) that affect groundwater quality.</p> <p><b>Operation:</b> No effect on groundwater quality anticipated because the use and maintenance of groundwater wells would not be a source of parameters of potential concern (i.e., metals) that affect groundwater quality.</p> <p><b>Closure:</b> No effect on groundwater quality anticipated because the decommissioning of groundwater wells would not be a source of parameters of potential concern (i.e., metals) that affect groundwater quality.</p>	<p><b>Construction:</b> No effect on groundwater quality anticipated because the installation of a surface water source would not interact with groundwater.</p> <p><b>Operation:</b> No effect on groundwater quality anticipated because the use and maintenance of a surface water source would not interact with groundwater.</p> <p><b>Closure:</b> No effect on groundwater quality anticipated because the decommissioning of a surface water source would not interact with groundwater.</p>	<p><b>Construction:</b> No effect on groundwater quality anticipated because the installation of a connection to the municipal supply would not interact with groundwater.</p> <p><b>Operation:</b> No effect on groundwater quality anticipated because the use of the municipal source would not interact with groundwater.</p> <p><b>Closure:</b> No effect on groundwater quality anticipated because the decommissioning of a connection to the municipal supply would not interact with groundwater.</p>
<p><b>Overall Groundwater Ranking</b>  <i>Key differentiating factor – the potential for effects is different between identified alternatives.</i></p>		<p><b>Disadvantage</b>                      Potential for effect on groundwater quantity and flow from prolonged water taking.</p>	<p><b>Advantage</b>                      No effects on groundwater are anticipated because a groundwater resource will not be disturbed or drawn from.</p>	<p><b>Advantage</b>                      No effects on groundwater are anticipated because a groundwater resource will not be disturbed or drawn from.</p>

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Surface Water	Change in surface water quantity or flow	<p><b>Construction:</b> No effect on surface water quantity and flow anticipated because the construction of groundwater wells would not interact with surface water features.</p> <p><b>Operation:</b> No effect on surface water quantity and flow anticipated because the use and maintenance of groundwater wells would not interact with surface water features.</p> <p><b>Closure:</b> No effect on surface water quantity and flow anticipated because the decommissioning of groundwater wells would not interact with surface water features.</p>	<p><b>Construction:</b> No effect on surface water quantity and flow anticipated because the installation of a surface water source would not require water taking. Water taking would begin in the construction phase which would have a negligible effect due to volume of taking and size of waterbody.</p> <p><b>Operation:</b> Limited effect on surface water quantity and flow from taking water from Kenogamisis Lake due to volume of taking and size of waterbody.</p> <p><b>Closure:</b> Negligible effect of water taking from Kenogamisis Lake due to volume of taking and size of waterbody. No effect on surface water quantity anticipated because the decommissioning of the surface water source would not require water taking.</p>	<p><b>Construction:</b> No effect on surface water quantity and flow are anticipated because it is expected that existing infrastructure or rights-of-way can be used to limit construction effects.</p> <p><b>Operation:</b> No effect on surface water quantity and flow anticipated because the use of the municipal water supply would not interact with surface water features.</p> <p><b>Closure:</b> No effect on surface water quantity and flow anticipated because the decommissioning of a connection to the municipal supply would not interact with surface water features.</p>
	Change in surface water quality	<p><b>Construction:</b> No effect on surface water quantity anticipated because the construction of groundwater wells would not interact with surface water features.</p> <p><b>Operation:</b> No effect on surface water quantity anticipated because the use and maintenance of groundwater wells would not interact with surface water features.</p> <p><b>Closure:</b> No effect on surface water quantity anticipated because the decommissioning of groundwater wells would not interact with surface water features.</p>	<p><b>Construction:</b> No effect on surface water quality anticipated because the installation of a surface water source would not be a source of parameters of potential concern (i.e., metals) that affect surface water quality. Sedimentation and spills during construction would be controlled using standard mitigation measures.</p> <p><b>Operation:</b> No effect on surface water quality anticipated because the use and maintenance of a surface water source would not be a source of parameters of potential concern (i.e., metals) that affect surface water quality.</p> <p><b>Closure:</b> No effect anticipated on surface water quality from water taking because the decommissioning of a surface water sources would not be a source of parameters of potential concern (i.e., metals) that affect surface water quality.</p>	<p><b>Construction:</b> No effect on surface water quality anticipated because the installation of a connection to the municipal supply would not interact with surface water features.</p> <p><b>Operation:</b> No effect on surface water quality anticipated because the use of the municipal source would not interact with surface water features.</p> <p><b>Closure:</b> No effect on surface water quality anticipated because the decommissioning of a connection to the municipal supply would not interact with surface water features.</p>
<b>Overall Surface Water Ranking</b> <i>Key differentiating factor – the potential for effects is different between identified alternatives.</i>		<b>Advantage</b> No effects anticipated because the construction, use and decommissioning of groundwater wells would not interact with surface water features.	<b>Disadvantage</b> Limited potential for localized effects on Kenogamisis Lake flow from water taking. The surface water source would not affect surface water quality because it would not be a source of contamination.	<b>Advantage</b> No effects anticipated because the construction, use and decommissioning of a connection to the municipal supply would not interact with surface water features.

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Valued Component (VC)/Criteria	Indicators	Alternative Method		
		Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
Fish and Fish Habitat	Change in fish habitat	<p><b>Construction:</b> No effect on fish habitat anticipated because the construction of groundwater wells would not interact with fish habitat.</p> <p><b>Operation:</b> No effect on fish habitat anticipated because the use of groundwater wells causing a change in groundwater quantity would cause negligible drawdown on nearby surface water features.</p> <p><b>Closure:</b> No effect on fish habitat anticipated because the decommissioning of groundwater wells would not interact with fish habitat.</p>	<p><b>Construction:</b> No effect on fish habitat anticipated because the installation of a surface water source would not substantially affect water quality, sediment composition, riparian vegetation, or in-stream cover.</p> <p><b>Operation:</b> Potential for localized change in fish habitat from water intake due to a change in flow.</p> <p><b>Closure:</b> No effect on fish habitat anticipated because the decommissioning of a surface water source would not substantially affect water quality, sediment composition, riparian vegetation, or in-stream cover.</p>	<p><b>Construction:</b> No effect on fish habitat anticipated because the installation of a connection to the municipal supply would not interact with fish habitat.</p> <p><b>Operation:</b> No effect on fish habitat anticipated because the use of the municipal supply would not interact with fish habitat.</p> <p><b>Closure:</b> No effect on fish habitat anticipated because the decommissioning of a connection to the municipal supply would not interact with fish habitat.</p>
	Change in fish	<p><b>Construction:</b> No mortality or sub-lethal effects anticipated because the construction of groundwater wells would not interact with fish.</p> <p><b>Operation:</b> No mortality or sub-lethal effects anticipated because the use and maintenance of groundwater wells would not interact with fish.</p> <p><b>Closure:</b> No mortality or sub-lethal effects anticipated because the decommissioning of groundwater wells would not interact with fish.</p>	<p><b>Construction:</b> No mortality or sub-lethal effects anticipated because it would be expected that the methods used for installation of the surface water source system would not cause the direct mortality of fish. No parameters of potential concern affecting fish health would be discharged to the aquatic environment.</p> <p><b>Operation:</b> Potential for fish entrainment in intake structures causing fish mortality.</p> <p><b>Closure:</b> No mortality or sub-lethal effects anticipated because it would be expected that the methods used for decommissioning of the surface water source system would not cause the direct mortality of fish. No parameters of potential concern affecting fish health would be discharged to the aquatic environment.</p>	<p><b>Construction:</b> No mortality or sub-lethal effects anticipated because the construction of a connection to the municipal supply would not interact with fish.</p> <p><b>Operation:</b> No mortality or sub-lethal effects anticipated because the construction of a connection to the municipal supply would not interact with fish.</p> <p><b>Closure:</b> No mortality or sub-lethal effects anticipated because the decommissioning of a connection to the municipal supply would not interact with fish.</p>
<p><b>Overall Fish and Fish Habitat Ranking</b>  <i>Key differentiating factor – the potential for effects is different between identified alternatives.</i></p>		<p><b>Advantage</b>                      No effects on fish or fish habitat are anticipated because the construction and decommissioning of groundwater wells would not interact with fish or fish habitat. The drawdown effects on surface water features from the use of groundwater because a source of potable water would be negligible.</p>	<p><b>Disadvantage</b>                      Potential for fish entrainment in intake structures and effects on fish habitat.</p>	<p><b>Advantage</b>                      No potential effects on fish and fish habitat are anticipated because the connection to the municipal supply would not interact with fish.</p>

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Valued Component (VC)/Criteria	Indicators	Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
Vegetation Communities	Change in abundance of vegetation species of interest	<b>Construction:</b> Surficial disturbance would be limited to areas where groundwater wells are installed and access routes, likely within or near the PDA. <b>Operation:</b> No additional vegetation removal would occur during operation. <b>Closure:</b> No additional vegetation removal would occur during closure, and access routes may be revegetated.	<b>Construction:</b> Surficial disturbance would be limited to within the disturbed area for Project development or along planned infrastructure routes. <b>Operation:</b> No additional vegetation removal would occur during operation. <b>Closure:</b> Disturbed areas would be revegetated following infrastructure removal.	<b>Construction:</b> Limited effect on vegetation because the installation of a connection to the municipal system would be primarily within the disturbed area for Project development or along existing cleared rights-of-way. <b>Operation:</b> No additional vegetation removal would occur during maintenance and use of a connection to the municipal system. <b>Closure:</b> No additional vegetation removal would occur during decommissioning of a connection to the municipal system.
	Change in abundance and condition of upland vegetation communities	<b>Construction:</b> No effect on wetland function and connectivity anticipated because the location of groundwater wells would be chosen to avoid the removal or alteration of wetlands. <b>Operation:</b> Limited potential for effects on wetland function from groundwater taking, but source would be located to avoid effects on sensitive areas. <b>Closure:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the decommissioning of the groundwater wells.	<b>Construction:</b> No effect on wetland function and connectivity anticipated because the installation of the surface water source would be routed to avoid removal or alteration of wetlands. <b>Operation:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the use and maintenance of the surface water source. <b>Closure:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the decommissioning of the surface water source.	<b>Construction:</b> No effect on wetland function and connectivity anticipated because the installation of a connection to the municipal system as would be routed to avoid removal or alteration of wetlands. <b>Operation:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the use and maintenance of the municipal system. <b>Closure:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the decommissioning of a connection to the municipal system.
	Change in wetland function or connectivity	<b>Construction:</b> No effect on wetland function and connectivity anticipated because the location of groundwater wells would be chosen to avoid the removal or alteration of wetlands. <b>Operation:</b> Limited potential for effects on wetland function from groundwater taking, but source would be located to avoid effects on sensitive areas. <b>Closure:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the decommissioning of the groundwater wells.	<b>Construction:</b> No effect on wetland function and connectivity anticipated because the installation of the surface water source would be routed to avoid removal or alteration of wetlands. <b>Operation:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the use and maintenance of the surface water source. <b>Closure:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the decommissioning of the surface water source.	<b>Construction:</b> No effect on wetland function and connectivity anticipated because the installation of a connection to the municipal system as would be routed to avoid removal or alteration of wetlands. <b>Operation:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the use and maintenance of the municipal system. <b>Closure:</b> No effect on wetland function and connectivity anticipated because the removal or alteration of wetlands would not be required for the decommissioning of a connection to the municipal system.
<b>Overall Vegetation Communities Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<b>Neutral</b> Limited potential for vegetation removal, relatively comparable across alternatives. Potential for effects on wetland function from water taking, but source would be located to avoid effects on sensitive areas.	<b>Neutral</b> Limited potential for vegetation removal, relatively comparable across alternatives. Surface water taking from Kenogamisis Lake is not anticipated to affect wetland function.	<b>Neutral</b> Limited potential for vegetation removal, relatively comparable across alternatives. Direct connection to the municipal system will not affect wetland function.
Wildlife and Wildlife Habitat	Change in movement, health or mortality risk of wildlife	<b>Construction:</b> Potential for minor wildlife disruption during construction activities. <b>Operation:</b> Operation would be relatively passive and is not anticipated to affect wildlife. <b>Closure:</b> Potential for minor wildlife disruption during decommissioning activities, but this would be temporary and disturbed areas would be restored to a natural state.	<b>Construction:</b> Potential for minor wildlife disruption during construction activities. <b>Operation:</b> Operation would be relatively passive and is not anticipated to affect wildlife. <b>Closure:</b> Potential for minor wildlife disruption during decommissioning activities, but this would be temporary and disturbed areas would be restored to a natural state.	<b>Construction:</b> Potential for minor wildlife disruption during construction activities. <b>Operation:</b> Operation would be relatively passive and is not anticipated to affect wildlife. <b>Closure:</b> Potential for minor wildlife disruption during decommissioning activities, but this would be temporary and disturbed areas would be restored to a natural state.
	Change in wildlife habitat	<b>Construction:</b> Potential for minor loss or alteration in wildlife habitat in areas where groundwater wells established to accommodate the location of the wells. <b>Operation:</b> The limited potential effect on wildlife habitat linked to wetland features due to drawdown from water taking can be managed through proper well siting. <b>Closure:</b> No effect on wildlife habitat anticipated because the decommissioning of groundwater wells would not require any additional removal or alteration of wildlife habitat.	<b>Construction:</b> Potential for minor loss or alteration in wildlife habitat to install the surface water intake. <b>Operation:</b> No effect on wildlife habitat anticipated because the use and maintenance of a surface water source would not require any removal or alteration of wildlife habitat. <b>Closure:</b> No effect on wildlife habitat anticipated because the decommissioning of a surface water source would not require any removal or alteration of wildlife habitat.	<b>Construction:</b> Potential for minor loss or alteration in wildlife habitat from construction activities. <b>Operation:</b> No effect wildlife habitat anticipated because the use and maintenance of a connection to the municipal system would not require any removal or alteration of wildlife habitat. <b>Closure:</b> No effect on wildlife habitat anticipated because the decommissioning of the municipal connection would not require any removal or alteration of wildlife habitat.
<b>Overall Wildlife and Wildlife Habitat Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<b>Neutral</b> The limited potential for wildlife disturbance is relatively comparable across alternatives.	<b>Neutral</b> The limited potential for wildlife disturbance is relatively comparable across alternatives.	<b>Neutral</b> The limited potential for wildlife disturbance is relatively comparable across alternatives.

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<b>Social Environment</b>				
Community Services and Infrastructure	Change in capacity of housing and accommodation	<b>Construction/Operation/Closure:</b> No expected change to existing community services or infrastructure, since a new groundwater supply would be independent from existing services.	<b>Construction/Operation/Closure:</b> No expected change to existing community services or infrastructure, since a new groundwater supply would be independent from existing services.	<b>Construction/Operation/Closure:</b> Existing capacity to service the Project is available through the municipal system, and installation and decommissioning activities would be planned so that they would not conflict with existing infrastructure.
	Change in capacity of health and emergency services and infrastructure			
	Change in the capacity of recreation and entertainment services and infrastructure			
	Change in the capacity provincial and municipal services and infrastructure			
<b>Overall Community Services and Infrastructure Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<b>Neutral</b> No effects on community services and infrastructure because a new groundwater supply would be independent from existing services.	<b>Neutral</b> No effects on community services and infrastructure because a new surface water supply would be independent from existing services.	<b>Neutral</b> No effects on community services and infrastructure because the municipal system has sufficient capacity to support the potable water supply needed for the Project.
Operational Health and Safety	Health and safety of mine workers	<b>Construction:</b> No effect on the health and safety of mine workers or local residents expected because the Project will be designed in consideration of avoiding the potential for operational failures that could lead to injury of workers and in consideration of providing a safe environment for local residents outside the PDA. <b>Operation:</b> No effect on the health and safety of workers or local residents because the potable water supply will meet the Ontario Drinking Water Quality Standards. <b>Closure:</b> No effect on the health and safety of mine workers or local residents expected because the potable water supply will no longer be required.	<b>Construction:</b> No effect on the health and safety of mine workers or local residents expected because the Project will be designed in consideration of avoiding the potential for operational failures that could lead to injury of workers and in consideration of providing a safe environment for local residents outside the PDA. <b>Operation:</b> No effect on the health and safety of workers or local residents because the potable water supply will meet the Ontario Drinking Water Quality Standards. <b>Closure:</b> No effect on the health and safety of mine workers or local residents expected because the potable water supply will no longer be required.	<b>Construction:</b> No effect on the health and safety of mine workers or local residents expected because the Project will be designed in consideration of avoiding the potential for operational failures that could lead to injury of workers and in consideration of providing a safe environment for local residents outside the PDA. <b>Operation:</b> No effect on the health and safety of workers or local residents because the potable water supply will meet the Ontario Drinking Water Quality Standards. <b>Closure:</b> No effect on the health and safety of mine workers or local residents expected because the potable water supply will no longer be required.
	Health and safety of local residents			
<b>Overall Operational Health and Safety Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<b>Neutral</b> Ontario Drinking Water Quality Standards regulate potable water quality requirements. Water from groundwater wells would be required to meet these standards.	<b>Neutral</b> Ontario Drinking Water Quality Standards regulate potable water quality requirements. Water from a surface water supply would be required to meet these standards.	<b>Neutral</b> Ontario Drinking Water Quality Standards regulate potable water quality requirements. Water from a connection to the Geraldton Municipal Supply would be required to meet these standards.

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<b>Economic Environment</b>				
Cost	Capital cost, Operational/maintenance cost, Rehabilitation/closure cost	<p><b>Construction:</b> Installation of the groundwater wells and supply system would require a moderate cost comparable to installation of other infrastructure. Environmental baseline groundwater samples from the PDA exceeded Ontario Drinking Water Quality Standards for arsenic, iron and manganese. Therefore, a treatment system would be required to be in compliance with the Ontario Drinking Water Quality Standards.</p> <p><b>Operation:</b> Operational costs associated with treatment and the need for ongoing maintenance and monitoring would be required.</p> <p><b>Closure:</b> Costs to close, remove or rehabilitate infrastructure should be relatively comparable for all alternative methods.</p>	<p><b>Construction:</b> Installation of the surface water supply system would require a moderate cost comparable to installation of other infrastructure. Environmental baseline surface water samples from Barton Bay exceeded Ontario Drinking Water Quality Standards for aluminum, arsenic, copper and lead. Surface water samples from other area of Kenogamisis Lake and other lakes and creeks were not as adversely affected as Barton Bay, but still exhibited exceedances of aluminum, arsenic, copper and lead. Therefore, a treatment system would be required to be in compliance with the Ontario Drinking Water Quality Standards.</p> <p><b>Operation:</b> Operational costs associated with treatment and the need for ongoing maintenance and monitoring would be required.</p> <p><b>Closure:</b> Costs to close, remove or rehabilitate infrastructure should be relatively comparable for all alternative methods.</p>	<p><b>Construction:</b> Installation of the connection to the Geraldton Municipal Supply would require a moderate cost comparable to installation of other infrastructure.</p> <p><b>Operation:</b> Municipal water infrastructure already in place so no additional treatment system would be required.</p> <p><b>Closure:</b> Costs to close, remove or rehabilitate infrastructure should be relatively comparable for all alternative methods.</p>
<b>Overall Cost Ranking</b> <i>Key differentiating factor – the potential for effects is different between identified alternatives.</i>		<b>Major Disadvantage</b> Higher cost to establish and maintain new treatment infrastructure.	<b>Major Disadvantage</b> Higher cost to establish and maintain new treatment infrastructure.	<b>Major Advantage</b> Cost effective to establish and maintain a municipal connection with no new treatment infrastructure being required.
Labour and Economy	Change in labour	<p><b>Construction:</b> The labour force required for the installation of all alternative methods would be comparable.</p> <p><b>Operation:</b> The labour force required for the maintenance of all alternative methods would be comparable.</p> <p><b>Closure:</b> The labour force required for the decommissioning of all alternative methods would be comparable.</p>	<p><b>Construction:</b> The labour force required for the installation of all alternative methods would be comparable.</p> <p><b>Operation:</b> The labour force required for the maintenance of all alternative methods would be comparable.</p> <p><b>Closure:</b> The labour force required for the decommissioning of all alternative methods would be comparable.</p>	<p><b>Construction:</b> The labour force required for the installation of all alternative methods would be comparable.</p> <p><b>Operation:</b> The labour force required for the maintenance of all alternative methods would be comparable.</p> <p><b>Closure:</b> The labour force required for the decommissioning of all alternative methods would be comparable.</p>
	Change in economy	<p><b>Construction:</b> No effects on local economic income or municipal government revenue are anticipated because the potential income to local businesses would be minimal and no municipal taxes would be required.</p> <p><b>Operation:</b> No effects on local economic income or municipal government revenue are anticipated because the potential income to local businesses would be minimal and no municipal taxes would be required.</p> <p><b>Closure:</b> No effects on local economic income or municipal government revenue are anticipated because the potable water supply would be decommissioned.</p>	<p><b>Construction:</b> No effects on local economic income or municipal government revenue are anticipated because the potential income to local businesses would be minimal and no municipal taxes would be required.</p> <p><b>Operation:</b> No effects on local economic income or municipal government revenue are anticipated because the potential income to local businesses would be minimal and no municipal taxes would be required.</p> <p><b>Closure:</b> No effects on local economic income or municipal government revenue are anticipated because the potable water supply would be decommissioned.</p>	<p><b>Construction:</b> No effects on local economic income or municipal government revenue are anticipated because the potential income to local businesses would be minimal and no municipal taxes would be required.</p> <p><b>Operation:</b> Rates and taxes for the use of the Geraldton Municipal Supply would be paid to the Municipality of Greenstone.</p> <p><b>Closure:</b> No effects on local economic income or municipal government revenue are anticipated because the potable water supply would be decommissioned</p>
<b>Overall Labour and Economy Ranking</b> <i>Key differentiating factor – the potential for effects is different between identified alternatives.</i>		<b>Disadvantage</b> No substantial effects on labour or economy are expected because there will be no change in employment or contribution to the local economy.	<b>Disadvantage</b> No substantial effects on labour or economy are expected because there will be no change in employment or contribution to the local economy	<b>Advantage</b> The Municipality of Greenstone would receive tax revenue for the use of municipal water.

**Appendix G6: Alternatives Evaluation – Potable Water Supply**

		Alternative Method		
Valued Component (VC)/Criteria	Indicators	Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
Technical Feasibility	Ability to implement/ commonly used technology in similar applications	<b>Construction:</b> Proven technology. Groundwater wells are commonly installed to be used as a source of drinking water. <b>Operation:</b> Proven technology. Groundwater wells are commonly used as a source of drinking water. Lower effectiveness and reliability due to the potential supply capacity requirements and the needs for treatment.	<b>Construction:</b> Proven technology. Surface water supply systems are commonly installed to be used as a source of drinking water. <b>Operation:</b> Proven technology. Surface water is commonly used as a source of drinking water. Lower effectiveness and reliability due to the potential supply capacity requirements and the needs for treatment.	<b>Construction:</b> Proven technology. Connections to municipal water systems are commonly installed as a source of drinking water. <b>Operation:</b> Proven technology. Municipal water systems commonly used as a source of drinking water. The municipal water system is already functioning and provides an effective and reliable source.
	Effectiveness/reliability	<b>Closure:</b> Proven technology. Groundwater wells are commonly decommissioned.	<b>Closure:</b> Proven technology. Surface water supply systems are commonly decommissioned.	<b>Closure:</b> Proven technology. Connections to municipal water systems are commonly decommissioned.
<b>Overall Technical Feasibility Ranking</b> <i>Key differentiating factor – the potential for effects is different between identified alternatives.</i>		<b>Major Disadvantage</b> Based on existing water quality and potential localized effects from Project components, it may not be technically feasible to treat groundwater to meet potable water quality requirements.	<b>Disadvantage</b> Although technically feasible to treat surface water to meet potable water quality requirements, potential disadvantage associated with effectiveness and reliability of a treatment system.	<b>Major Advantage</b> Would provide an effective, reliable and proven supply method to meet potable water quality requirements, because no additional treatment would be required to address water quality issues since water will be treated municipally.
<b>Cultural Environment</b>				
Heritage Resources	Change in archaeological sites	<b>Construction:</b> New groundwater wells would be localized to the PDA or near vicinity, and will not result in any additional removal, disruption or displacement of archaeological sites or architectural or historical resources. <b>Operation:</b> No change anticipated because the use and maintenance of groundwater wells would not result in the removal, disruption or displacement of archaeological sites or architectural or historical resources.	<b>Construction:</b> Surface water sources will be localized to the PDA or near vicinity, and their use will not result in any additional effects on cultural heritage resources. <b>Operation:</b> No change anticipated because the use and maintenance of a surface water source would not result in the removal, disruption or displacement of archaeological sites or architectural or historical resources.	<b>Construction:</b> Existing potable water supply is already established, and will not result in any additional effects on cultural heritage resources. Connection would occur within the PDA or along previously disturbed rights-of-way.
	Change in architectural or historical resources	<b>Closure:</b> No change anticipated because the decommissioning of groundwater wells would not result in the removal, disruption or displacement of archaeological sites or architectural or historical resources.	<b>Closure:</b> No change anticipated because the decommissioning of a surface water source would not result in the removal, disruption or displacement of archaeological sites or architectural or historical resources.	<b>Operation:</b> No change anticipated because the use of the municipal supply would not result in the removal, disruption or displacement of archaeological sites or architectural or historical resources. <b>Closure:</b> No change anticipated because the decommissioning of a connection to the municipal supply would not result in the removal, disruption or displacement of archaeological sites or architectural or historical resources.
<b>Overall Heritage Resources Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<b>Neutral</b> No effect on heritage resources are anticipated because installation effects would be largely limited to the PDA and there will be no additional removal, disruption or displacement of archaeological sites or architectural or historical resources.	<b>Neutral</b> No effect on heritage resources are anticipated because installation effects would be largely limited to the PDA and there will be no additional removal, disruption or displacement of archaeological sites or architectural or historical resources.	<b>Neutral</b> No effect on heritage resources are anticipated because the existing potable water supply is already established and connection would occur within the PDA or along previously disturbed rights-of-way.
Traditional Land and Resource Use	Change in Aboriginal communities' cultural practices	<b>Construction/Operation/Closure:</b> New groundwater wells will be localized to the PDA or near vicinity, and will not result in any additional effects on traditional land and resource use.	<b>Construction/Operation/Closure:</b> Surface water sources will be localized to the PDA or near vicinity, and their use will not result in any additional effects on traditional land and resource use.	<b>Construction/Operation/Closure:</b> Existing potable water supply is already established, and will not result in any additional effects on traditional land and resource use.
	Change in Aboriginal communities' traditional land uses (including hunting, fishing, trapping and harvesting)			
<b>Overall Traditional Land and Resource Use Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<b>Neutral</b> Infrastructure would be localized to the PDA or near vicinity, and will not result in any additional effects on traditional land and resource use.	<b>Neutral</b> Infrastructure would be localized to the PDA or near vicinity, and will not result in any additional effects on traditional land and resource use.	<b>Neutral</b> Infrastructure would be localized to the PDA or near vicinity, and will not result in any additional effects on traditional land and resource use.

**Appendix G6: Alternatives Evaluation – Potable Water Supply**

Valued Component (VC)/Criteria	Indicators	Alternative Method		
		Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
<b>Built Environment</b>				
Land and Resource Use	Change in recreational land and resource use	<b>Construction/Operation/Closure:</b> No change in recreational or commercially-based land and resource use or navigation because new groundwater wells will be localized to the PDA or near vicinity and will not result in any additional access restrictions or removal of land and resource use areas.	<b>Construction/Operation/Closure:</b> Surface water sources will be localized to the PDA or near vicinity, and their use will not result in any additional effects on land and resource use.	<b>Construction/Operation/Closure:</b> Existing potable water supply is already established, and will not result in any additional effects on land and resource use.
	Change in navigation			
	Change in commercially-based land and resource use			
<b>Overall Land and Resource Use Ranking</b> <i>Not a key differentiating factor – the potential for effects is comparable across all identified alternatives.</i>		<b>Neutral</b> Infrastructure would be localized to the PDA or near vicinity, and will not result in any additional effects on land and resource use.	<b>Neutral</b> Infrastructure would be localized to the PDA or near vicinity, and will not result in any additional effects on land and resource use.	<b>Neutral</b> Infrastructure would be localized to the PDA or near vicinity, and will not result in any additional effects on land and resource use.

**OVERALL ALTERNATIVE RANKING BASED ON KEY DIFFERENTIATING FACTORS**

Key Differentiating Factors	Groundwater Wells	Surface Water	Connect to Geraldton Municipal Supply
<b>Groundwater</b>	<b>Disadvantage</b> - Potential to decrease groundwater quantity and flow from prolonged water taking.	<b>Advantage</b> - No effects on groundwater are anticipated because a groundwater resource will not be disturbed or drawn from.	<b>Advantage</b> - No effects on groundwater are anticipated because a groundwater resource will not be disturbed or drawn from.
<b>Surface Water</b>	<b>Advantage</b> - No effects anticipated because the construction, use and decommissioning of groundwater wells would not interact with surface water features.	<b>Disadvantage</b> - Limited potential for localized effects on Kenogamisis Lake flow from water taking.	<b>Advantage</b> - No effects anticipated because the construction, use and decommissioning of a connection to the municipal supply would not interact with surface water features.
<b>Fish and Fish Habitat</b>	<b>Advantage</b> - No effects on fish or fish habitat are anticipated because the construction and decommissioning of groundwater wells would not interact with fish or fish habitat.	<b>Disadvantage</b> - Potential for fish entrainment in intake structures and effects on fish habitat.	<b>Advantage</b> - No effects on fish and fish habitat are anticipated because the connection to the municipal supply would not interact with fish or fish habitat.
<b>Cost</b>	<b>Major Disadvantage</b> - Higher costs associated with treatment and maintenance.	<b>Major Disadvantage</b> - Higher costs associated with treatment and maintenance.	<b>Major Advantage</b> - Lowest capital and operating costs.
<b>Labour and Economy</b>	<b>Disadvantage</b> - No substantial changes in labour or economy are expected because there will be no change in employment or contribution to the local economy.	<b>Disadvantage</b> - No substantial changes in labour or economy are expected because there will be no change in employment or contribution to the local economy.	<b>Advantage</b> - The Municipality of Greenstone would receive tax revenue for the use of municipal water.
<b>Technical Feasibility</b>	<b>Major Disadvantage</b> - Based on existing water quality and potential localized effects from Project components, it may not be technically feasible to treat groundwater to meet potable water quality requirements.	<b>Disadvantage</b> - Although technically feasible to treat surface water to meet potable water quality requirements, potential disadvantage associated with effectiveness and reliability of a treatment system to address drinking water quality exceedances in local surface water.	<b>Major Advantage</b> - No additional treatment required to address water quality issues since water will be treated municipally.
<b>OVERALL</b>	<b>NOT PREFERRED</b>	<b>NOT PREFERRED</b>	<b>PREFERRED</b>