## ECACEP Scenario - A Stewardship Ethic

### Planning Factor: Water Quality and Quantity

#### Theme: Community and our Environment – Controlled Growth

<table>
<thead>
<tr>
<th>Force/Driver</th>
<th>Scenario Assumptions (developed by workshop participants)</th>
<th>Forces/drivers/outcomes from Consolidated Report that could support this scenario (developed by workshop participants)</th>
<th>Supportive Information from Topic and Focus papers</th>
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</thead>
</table>
| Climate change |  | • Increased weather variability  
• Shifting weather patterns create uncertain supplies of water and more rain/drought cycles  
• Drier climate and atmospheric air; decreased availability of drinking water, ground water and soil quality; dryer wetlands, well water and recharge areas  
• Amount of arable land decreases  
• Wildlife declines  
• Communications/education helps people adjust to climate change/drought conditions | • A warming world  
• By 2050 Calgary, Edmonton, Grande Prairie and Fort McMurray are projected to experience degree-day totals similar to Lethbridge and Medicine Hat today  
• Longer growing season/shorter milder winters  
• Reduced snow accumulation – declines in annual streamflow- shift in streamflow to earlier in the year = lower summer water supplies  
• Drier soils – decrease in subsurface recharge leading to decline in the water table  
• Increased soil erosion leading to increase in stream sediment and nutrient load (increased eutrophication and pathogen loading in local water bodies and streams during summer  
• Increased frequency of extreme weather events  
• Could have enhanced productivity of forests, crops and grasslands – where there is adequate moisture  
• Summertime drying – greater water loss by evaporation and plant transpiration |
| Wetlands | • Provincial wetland inventory utilized to set goals for wetland protection and restoration  
• Society values wetlands | • Recognition of contribution of wetlands to water quality and quantity  
• People begin to value and protect wetlands  
• Wetlands are restored throughout the watersheds in Alberta | • 71% of wetlands in the Prairie Region have been lost (2003)  
• Drainage has been encouraged through policies and incentives  
• Conflicts are common between communal and individual rights to resources  
• Crown owns the water in a wetland, but the surrounding land, bed and shores of non-natural or non-permanent wetlands can be privately owned  
• Wetlands help recharge underground aquifers that store 97% of the world’s unfrozen freshwater (groundwater recharge occurs where there are ponds - and mostly occurs in spring and early summer – before evaporation intercepts seepage outflow from ponds.  
• Benefits include increase soil moisture for crop production and increased deep aquifer recharge for well water maintenance  
• Wetlands store as much as 40% of global terrestrial carbon (carbon sinks)  
• Plants and soils in wetlands purify water, removing nitrogen and phosphorous, and in some cases toxic chemicals  
• Freshwater wetlands hold more than 40% of the world’s species and 12% of all animal species  
• Recreational activities associated with wetlands (and which generate income locally) are boating, hunting, bird watching, art and literature |
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<thead>
<tr>
<th>Ecological Goods &amp; Services (EG&amp;S)</th>
<th>Water supply</th>
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<tbody>
<tr>
<td>• EG&amp;S are valued, measured and sustained/increased</td>
<td>• Source water is protected through wiser management</td>
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<td>• Increased emphasis on EG&amp;S produced by agriculture</td>
<td>• Water shortages and droughts</td>
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<td>• EG&amp;S are regulated to ensure healthy environments and communities</td>
<td>• Water conservation attitude is developed and becomes a priority</td>
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<tr>
<td>• EG&amp;S are recognized and assigned an economic value</td>
<td>• Improved agricultural practices lead to improved ecosystems and conservation of water supplies</td>
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<td>• A whole suite of EG&amp;S are identified to support ecological values (e.g.: Retention of native vegetation is compensated)</td>
<td>• Increased demand from growing populations, agriculture and industry</td>
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<td>• We determine In-stream Flow Needs (IFN) first – as the basis to sustain a healthy aquatic ecosystem and healthy river – before water allocations are made.</td>
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<tr>
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<td>• Groundwater supply is protected</td>
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<td>• Reclamation/restoration of surface water supply is improved and becomes a priority</td>
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<td>• Natural capital yields EG&amp;S, which is almost always overlooked in calculating Canada’s assets.</td>
<td>• Study area lies mostly in the Battle River Basin (BRB)</td>
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<td>• Value of wetlands to Canadians is estimated at $20 billion</td>
<td>– Primary surface water source</td>
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<td>• Forests provide air quality, carbon storage and sequestration, soil formation, water treatment, biological control, stormwater control, recreation, culture, raw materials and genetic resources.</td>
<td>– Water is derived entirely from local surface run-off (rain and snow melt) and ground water flows. River flows dependent on precipitation, resulting in tremendous variability in annual flows</td>
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<tr>
<td>• Grasslands and rangeland provide water regulation, erosion control, soil formation, waste treatment, pollination, carbon storage and sequestration, biological control and food production</td>
<td>– Total current average surface water use is about 19% of average natural flow</td>
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<tr>
<td>• Wetlands provide water supply and treatment, disturbance regulation, food production, recreation, culture, habitat and refuge</td>
<td>• North Saskatchewan River Basin (NSRB) is also important (especially around Tofield)</td>
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<td>• Lakes. Rivers and riparian areas provide water supply and treatment, food production and recreation</td>
<td>• Trends in the NSRB:</td>
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<tr>
<td>• Croplands provide food production, habitat/refuge, scenic (over 80% of the region)</td>
<td>– Increase in water use in the NSRB is the result of petroleum sector (bitumen upgraders and coal gasification plants</td>
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<td>• Undeveloped lands provide scenic, carbon sequestration and storage, tourism</td>
<td>– Annual groundwater use is expected to increase around 13%</td>
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<td>• Groundwater- used mostly for agriculture (stockwatering). 12 municipalities in the area rely on groundwater for their municipal water supply</td>
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October 2008  
Abells Henry Public Affairs
### Water use
- Demand requires water to be piped into homes
- Well-water supply is safeguarded
- Pumped water is used to water livestock so they do not contaminate the source
- Better management techniques and equipment lower demand and increase quality
- True cost of water usage is paid for by the consumer
- Wastewater is better managed and treated
- Water recycling is encouraged and adopted

### Water river uses:
- ATCO (cooling thermal electric power facility) is biggest user – but 98% is returned to river after use
- Agriculture (irrigation, feedlots, stockwater) second largest user
- Wildlife conservation – uses about 30%
- By 2030 water use for agriculture is projected to increase by 18%, in part due to expanding livestock operation
- Carrying capacity of pastureland could decrease with increased water restraints

### Water licenses:
- Upper basin uses 70-79% of its allocated water; middle basin use 60-76% of its allocation through water licenses

#### Trends: Battle River
- Key sectors driving future use: population growth (especially in upper basin); expansion of livestock populations; industrial growth; oilfield injection
- Increased groundwater uses: stockwatering; industrial; recreation

### Water Quality
- Surface water is generally poor. Battle River frequently has high concentrations of fecal bacteria and numerous pesticides and personal care products have been detected.
- Poor water quality is a result of low flows (increased contact time with surrounding soils) and point (industrial and municipal) and non-point (primarily agriculture) discharge into the Battle River.
- As a result of high nutrient concentrations, frequent excessive growth of algae and aquatic plants occurs in most bodies of water in the project area.
- Water quality in the lakes sampled is generally poor with high nutrient concentrations.

### Water management
- Water conflicts arise as water allocations are fully utilized
- Water shortages impact sizes of communities and types of farming and industry
- Water management becomes an important governance issue
- Shared responsibility leads to improved practices and watershed management
- Policy moves beyond reclamation to restoration
- Pace of reclamation increases
- Policies are developed to support water recycling
- Assurance role of government is strengthened
## Reclamation

| Reclamation/restoration of surface water supply is improved and becomes a priority |
| Policy moves beyond reclamation to restoration |
| Pace of reclamation increases |

- Has been based on Equivalent Land Capability (ELC).  
- Municipal land zoning policies are factored into the regulatory process for reclamation  
- Processes are becoming more collaborative.  
- Major factor is still to achieve agricultural supportive lands, however wetlands are now being taken into account.  
- Current policy is of 3:1 compensation ratio for wetlands. Aim is to quickly re-establish riparian corridors (wetland areas)  
- Balanced approach to reclamation now in use – intent is to provide more than one ag land use (e.g. rotational ag production and cattle pasturing) using progressive reclamation approach (forage/hay crop first to build up nitrogen and reduce compaction, then cereal crops.  
- Plus the creation of wetlands, e.g. lakes for wildlife, fisheries, recreation, etc. and forested land