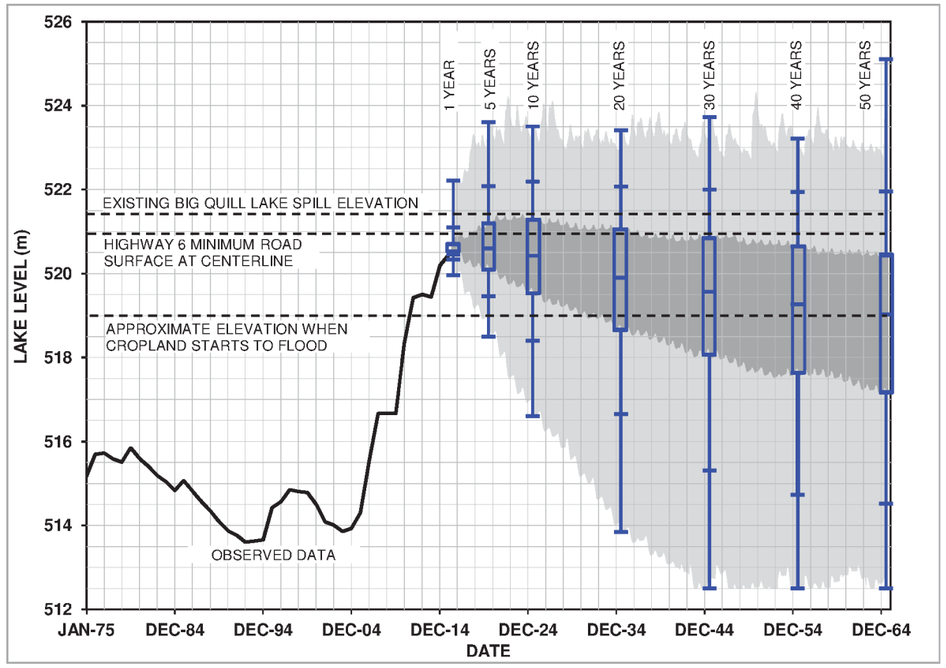
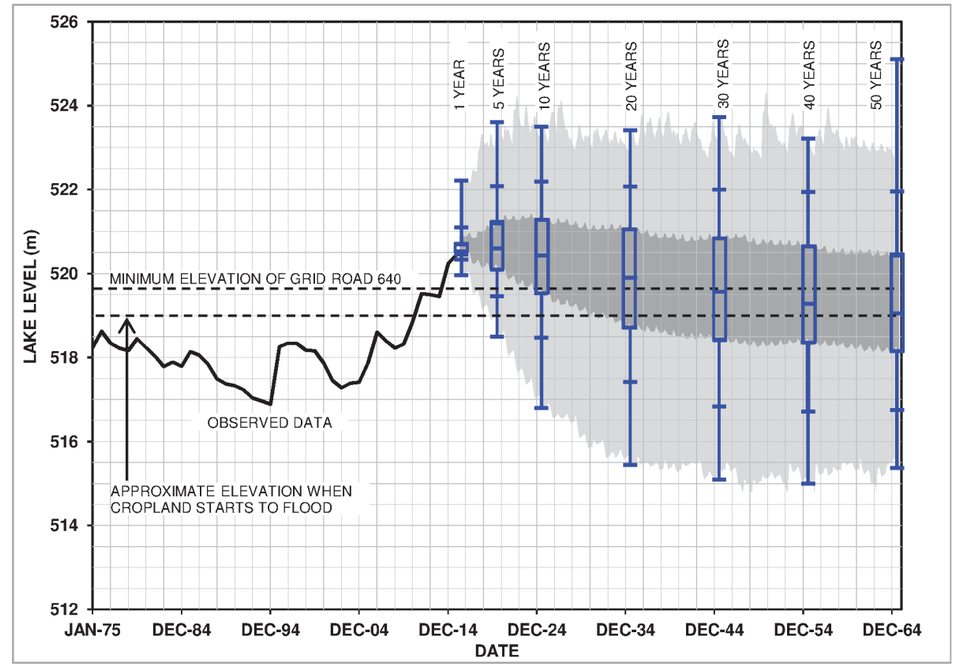
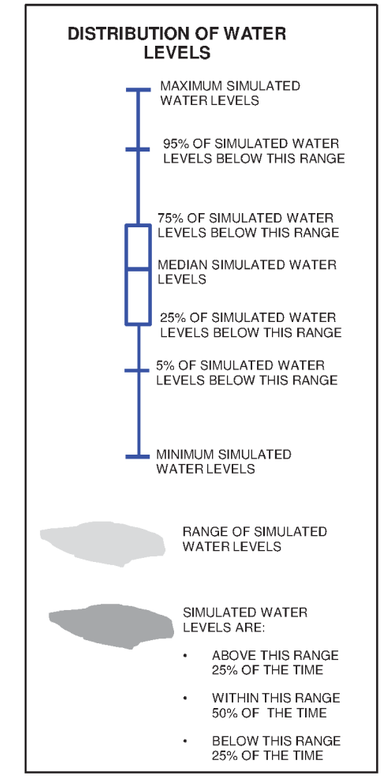
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

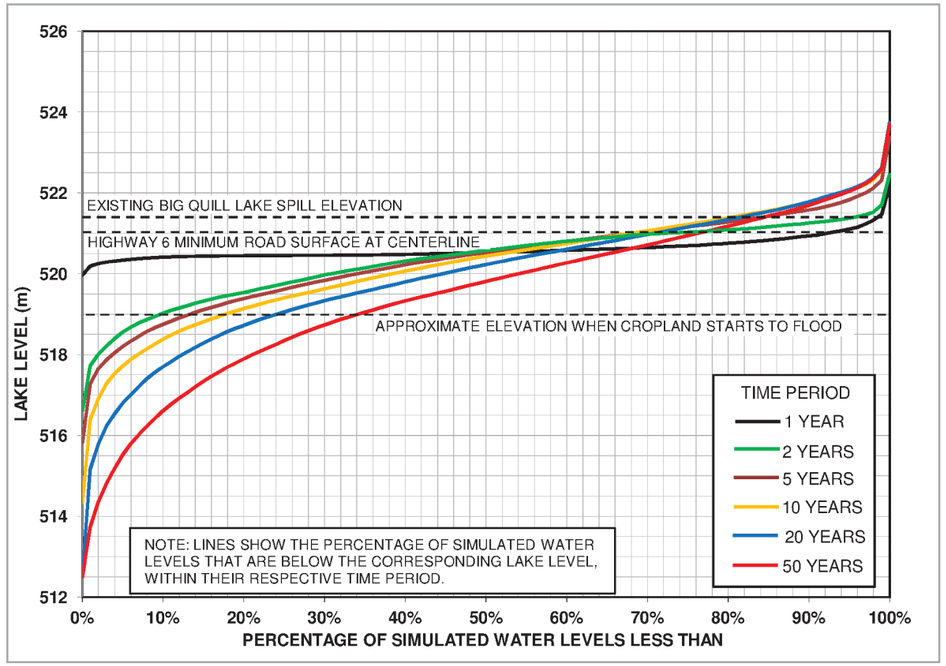


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

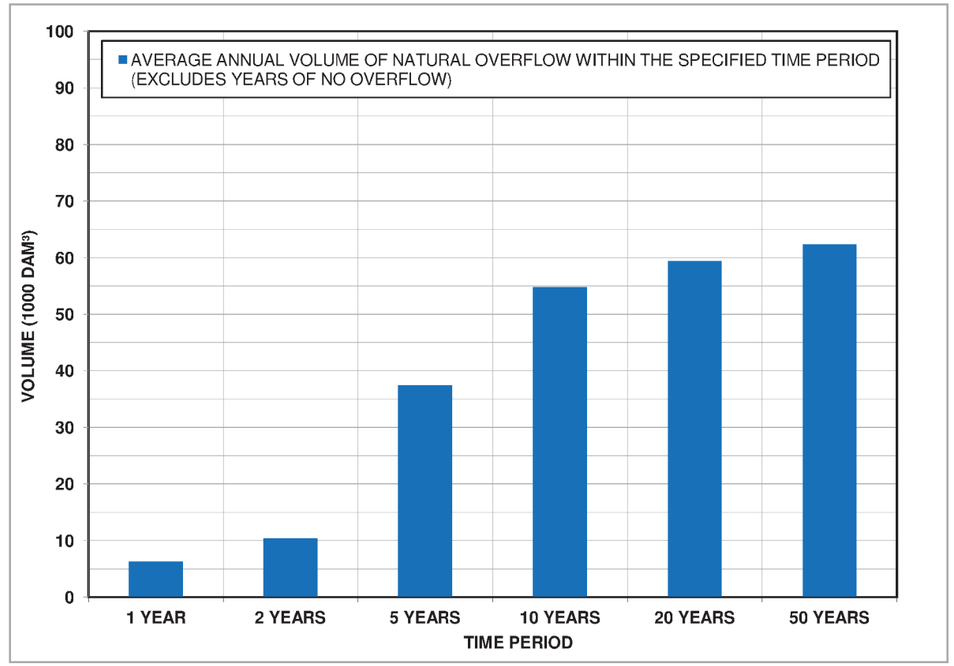


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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Water Security Agency

QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
EXISTING CONDITIONS
DO NOTHING (BASE CASE)

NOVEMBER 2016 | PLATE 06 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Hold Water\Do Nothing\Flood Mitigation Options-Base Case.xlsm
11"x17" PLOT SCALE 1:1

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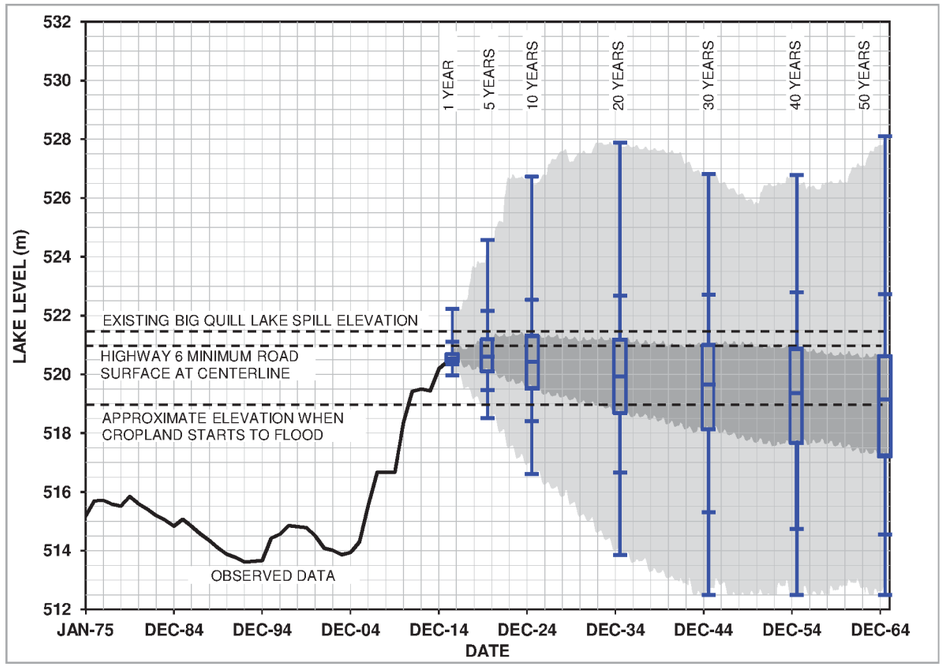
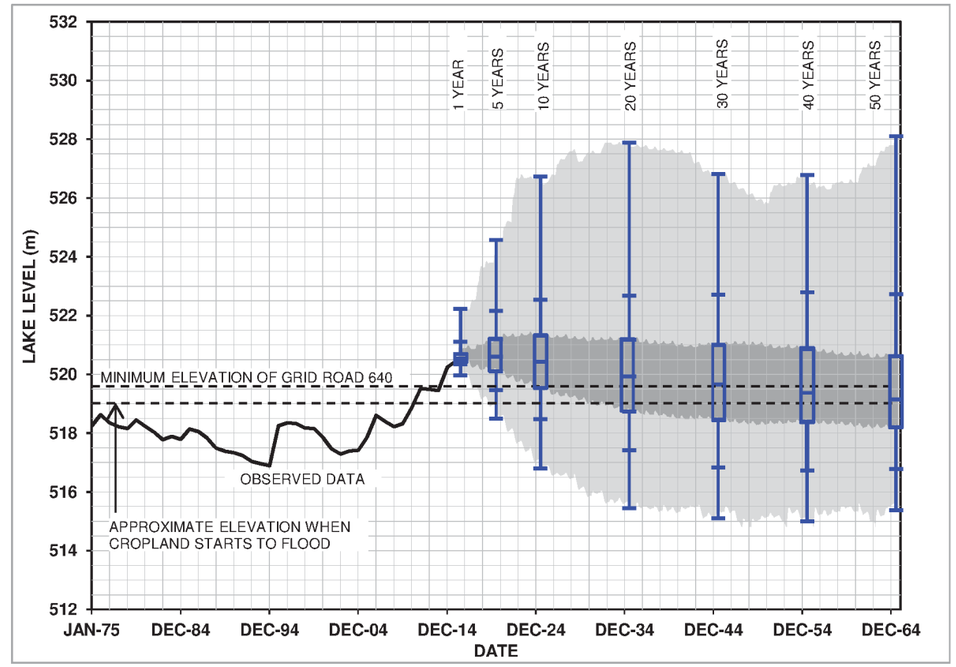
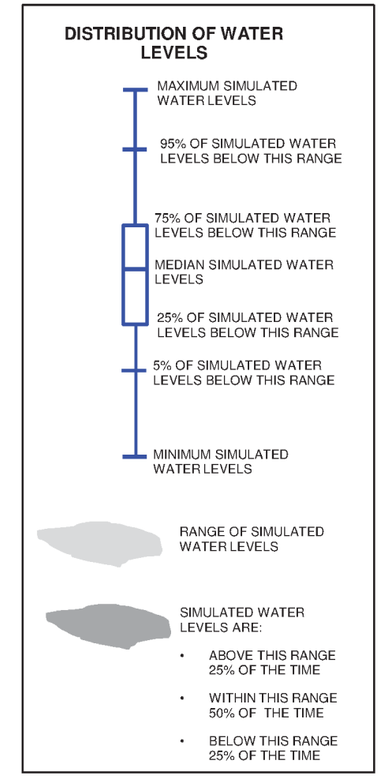
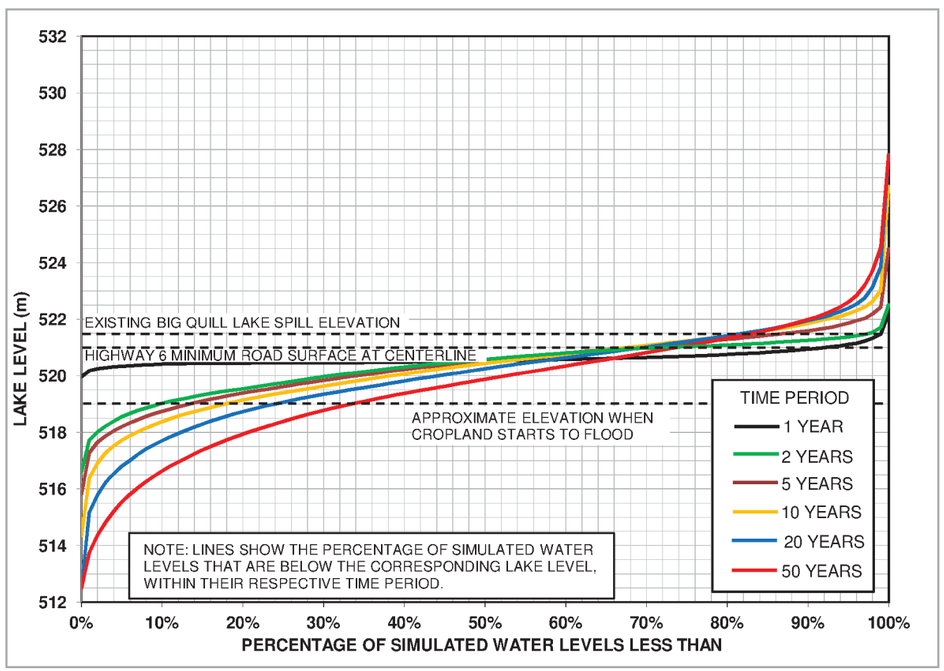


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

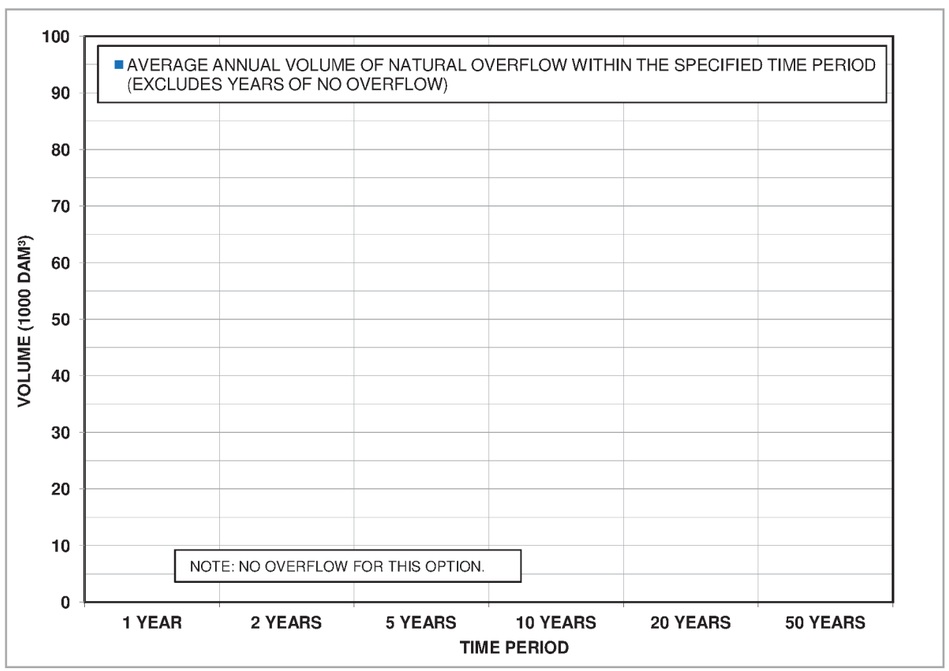


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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Water Security Agency

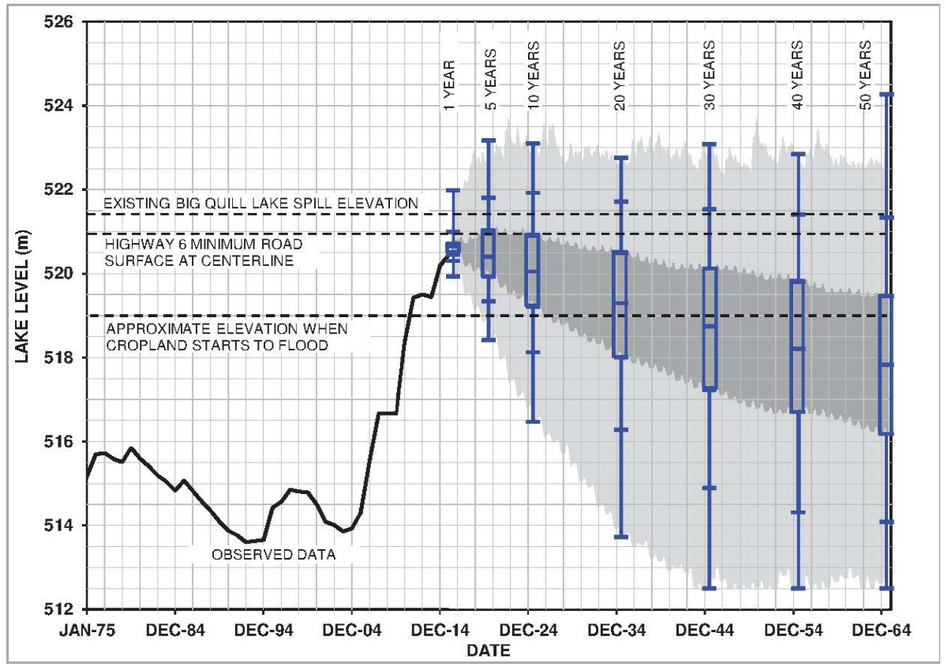
QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
BLOCK NATURAL OUTLET OPTION

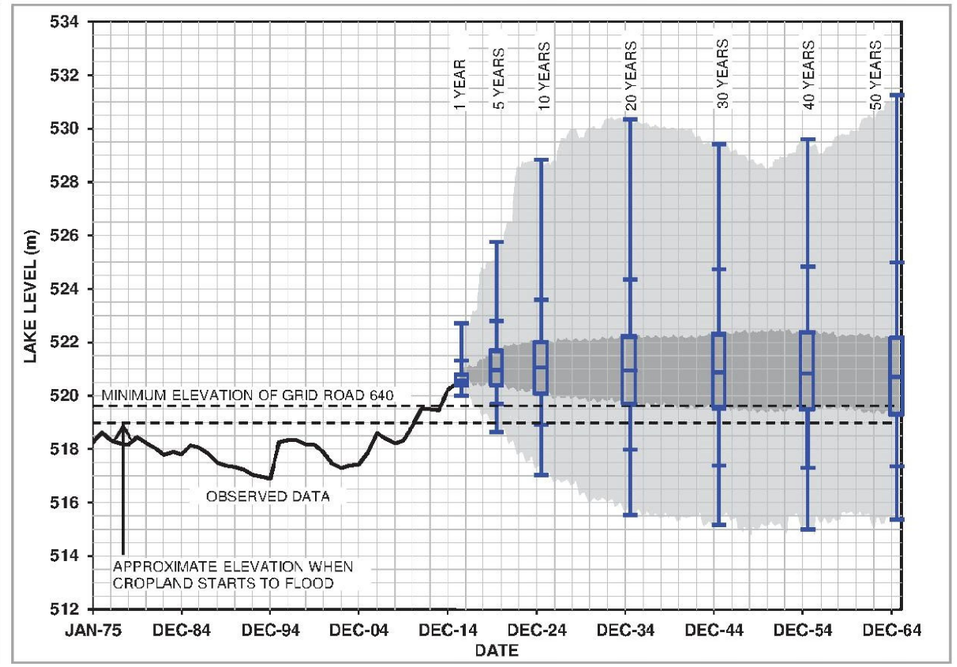
NOVEMBER 2016 | PLATE 07 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Hold Water\Block Natural Outlet\Flood Mitigation Options-Block Natural Outlet.xlsm
11"x17" PLOT SCALE 1:1

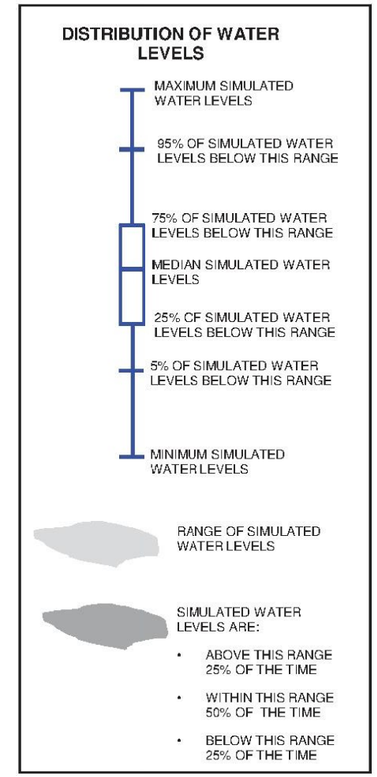
DATA PRODUCED BY KGS GROUP. ALL RIGHTS RESERVED

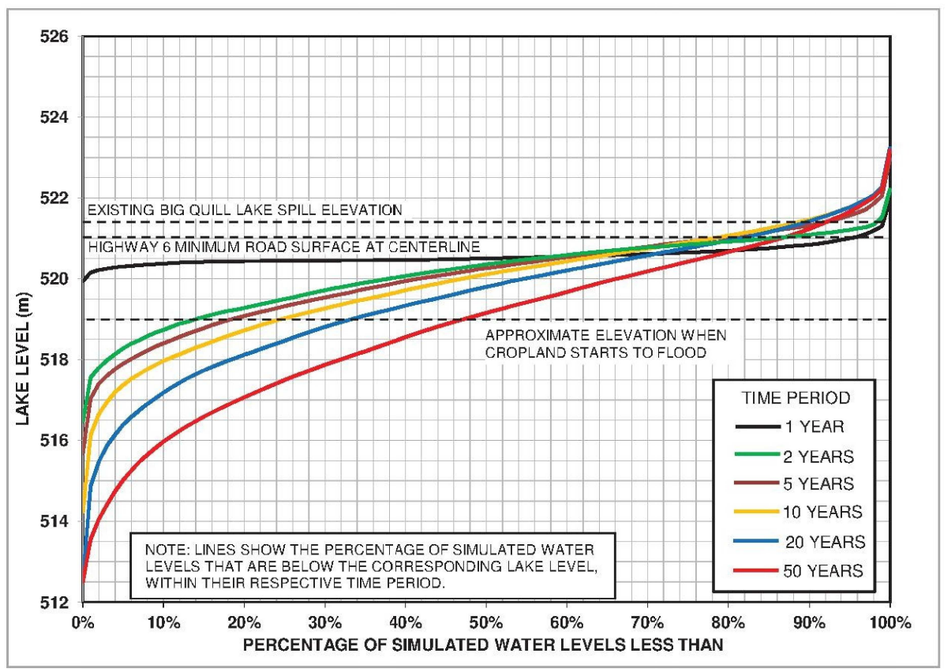


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

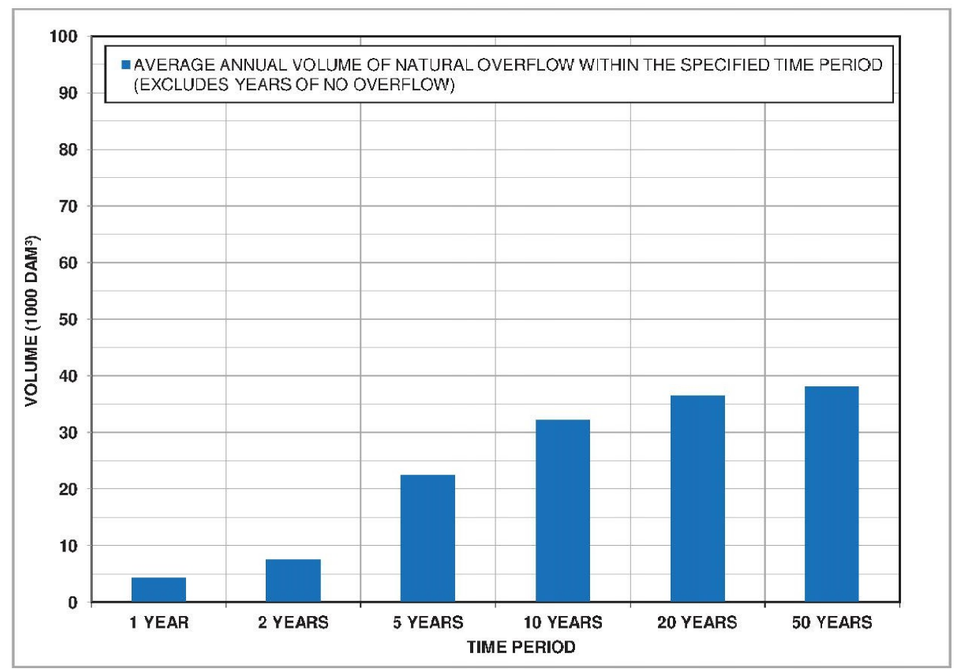


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
ISOLATE LITTLE QUILL LAKE OPTION

NOVEMBER 2016 | PLATE 08 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Hold Water\Isolate Little Quill Lakes\Flood Mitigation Options-Isolate LQL.xlsm
11"x17" PLOT SCALE 1:1

DATA PRODUCED BY KGS GROUP.
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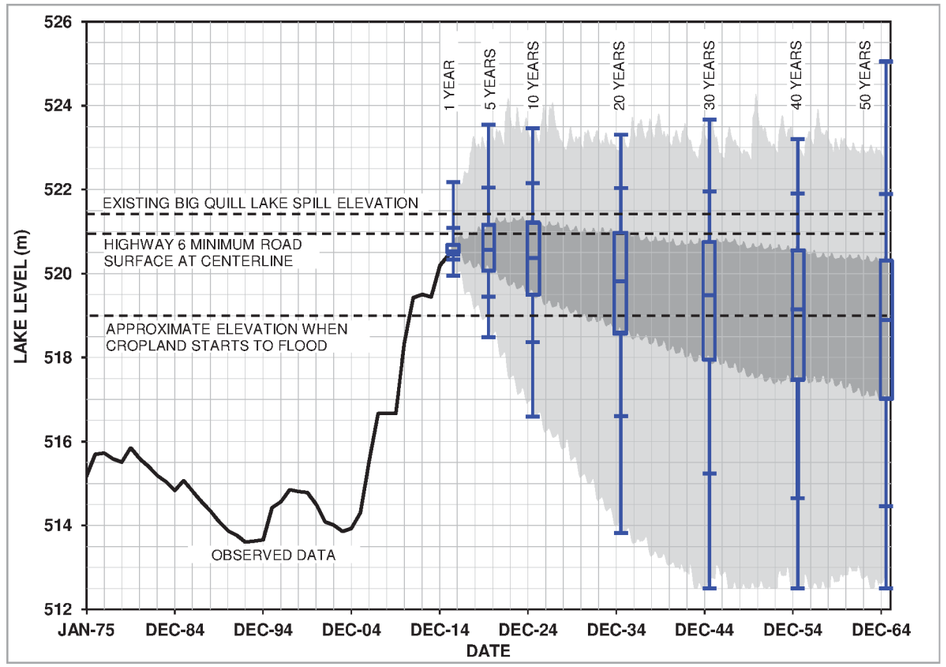
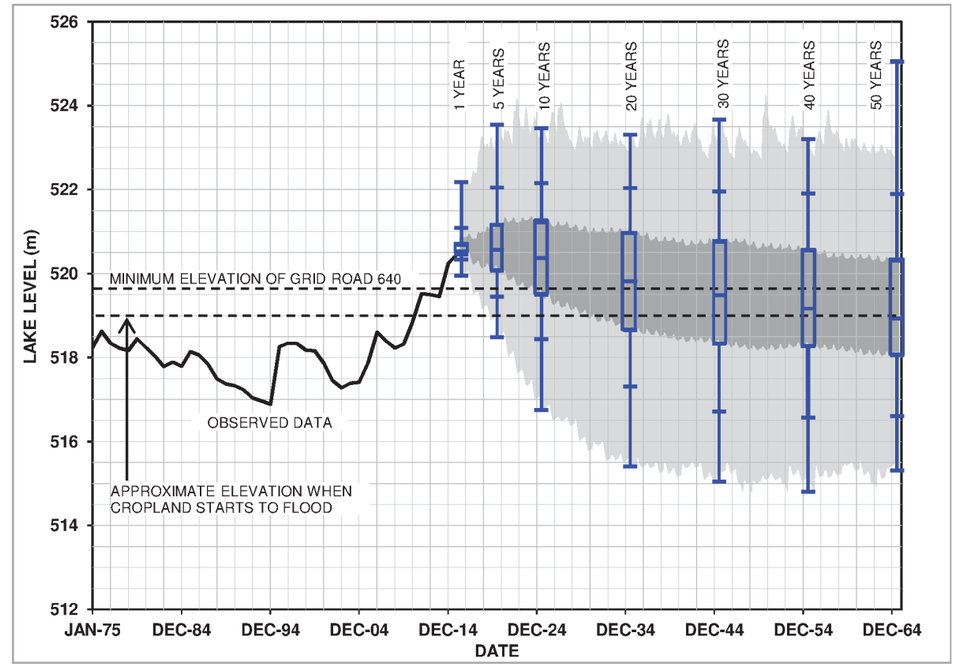
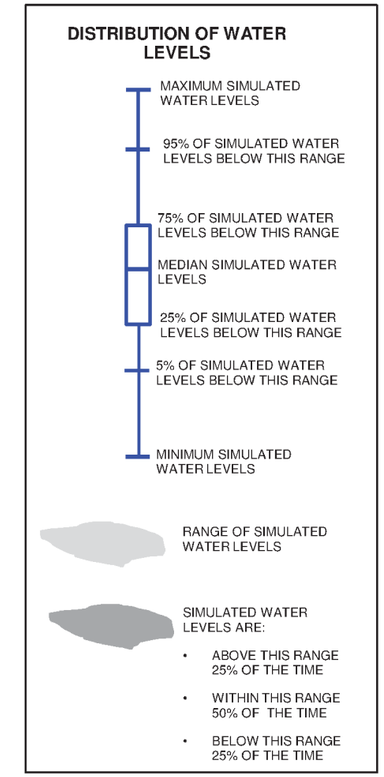
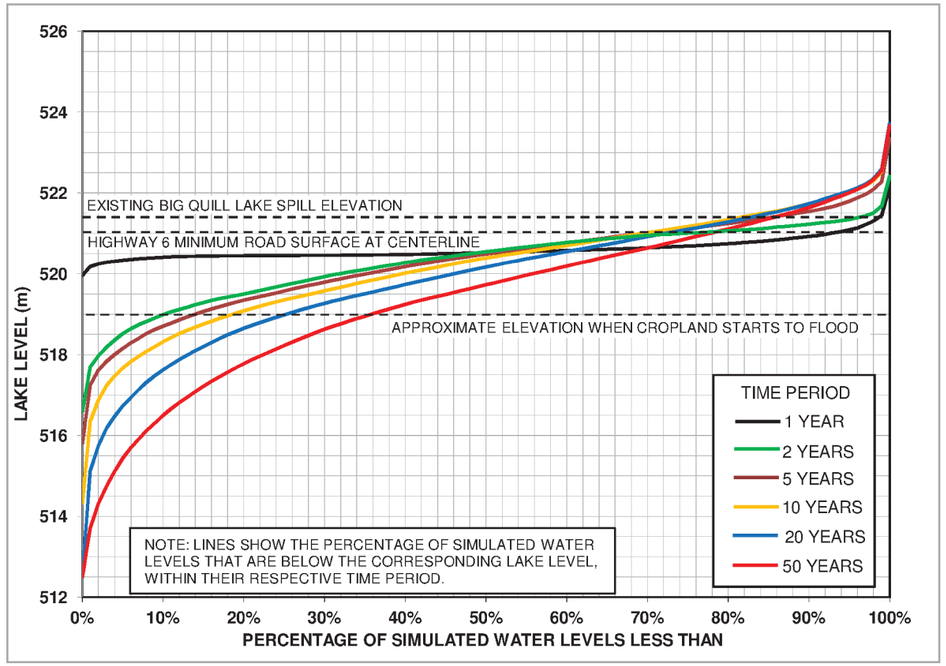


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

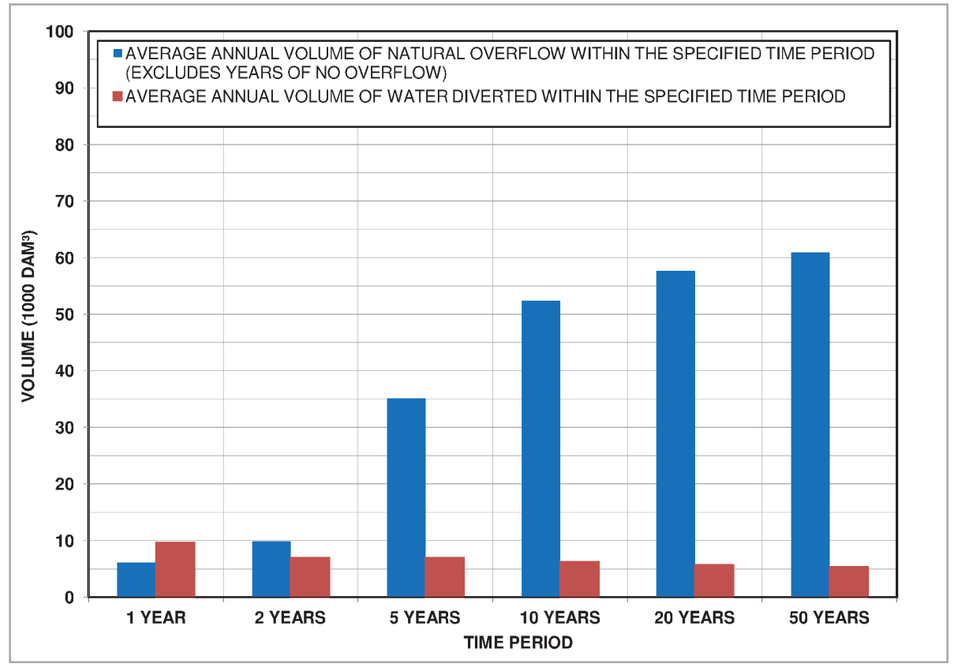


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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Water Security Agency

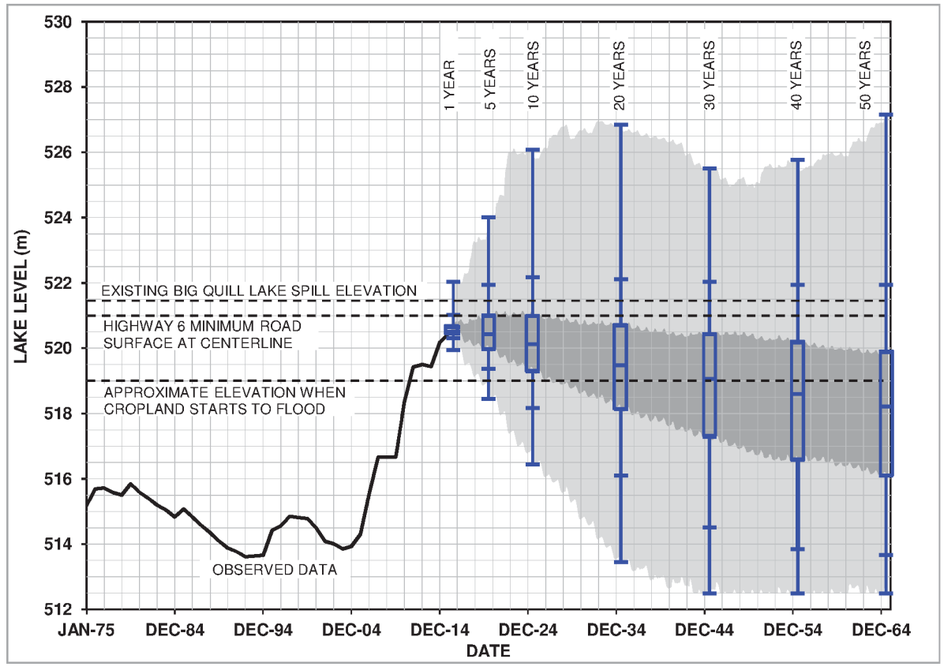
QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
PONASS LAKES DIVERSION OPTION

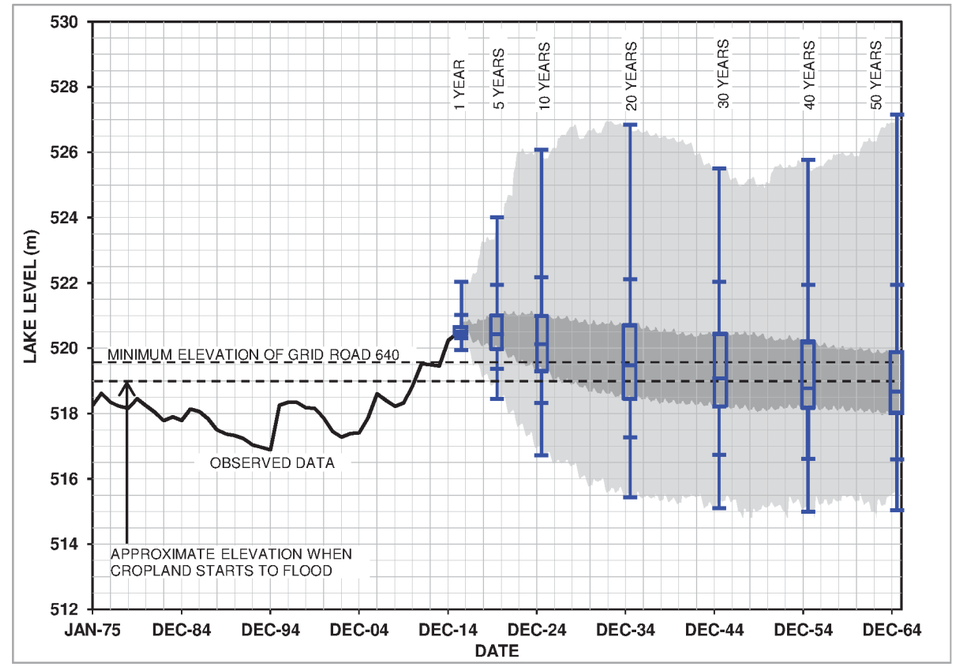
NOVEMBER 2016 | PLATE 09 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options-Ponass Lake Diversion V2.xlsm
11"x17" PLOT SCALE 1:1

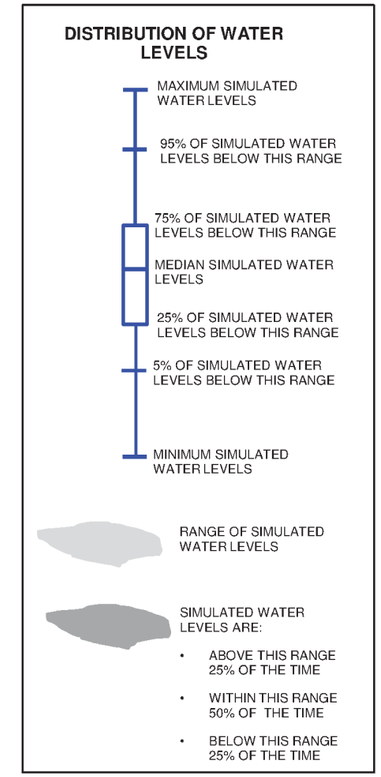
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

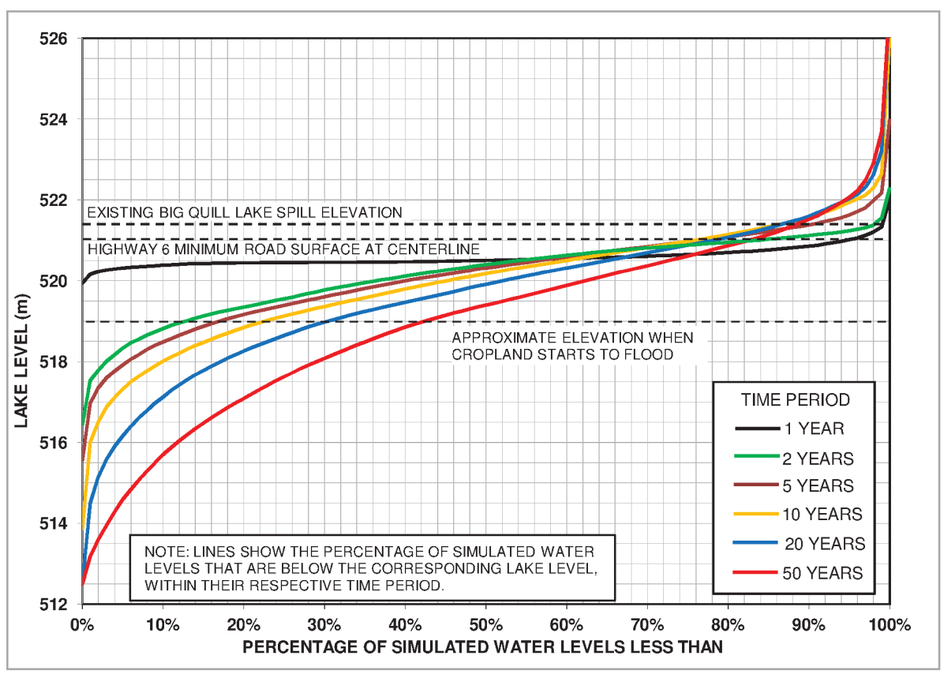


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

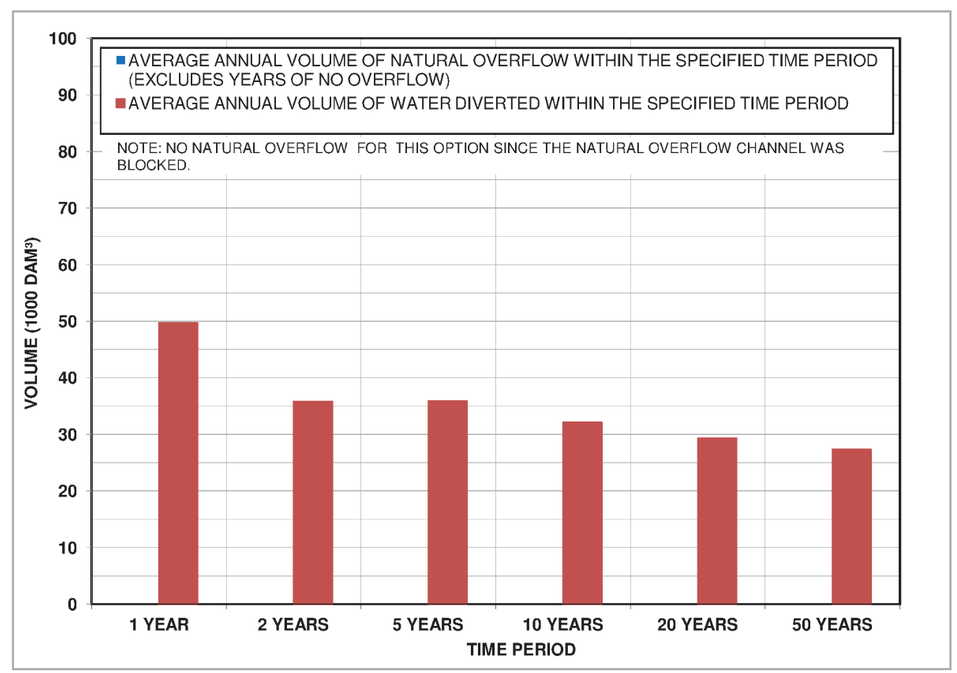


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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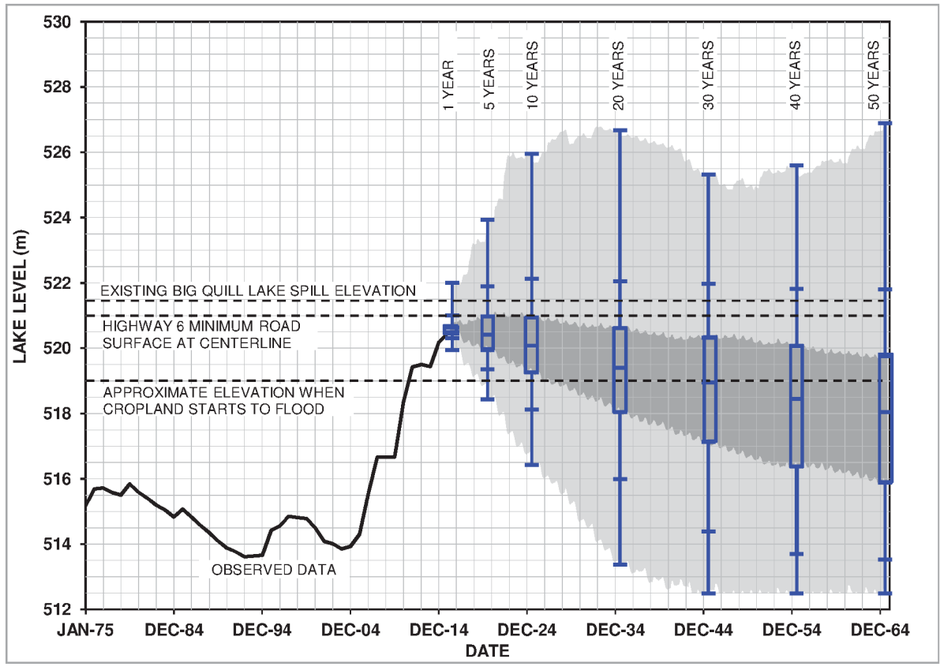
QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
KUTAWAGAN CREEK DIVERSION OPTION

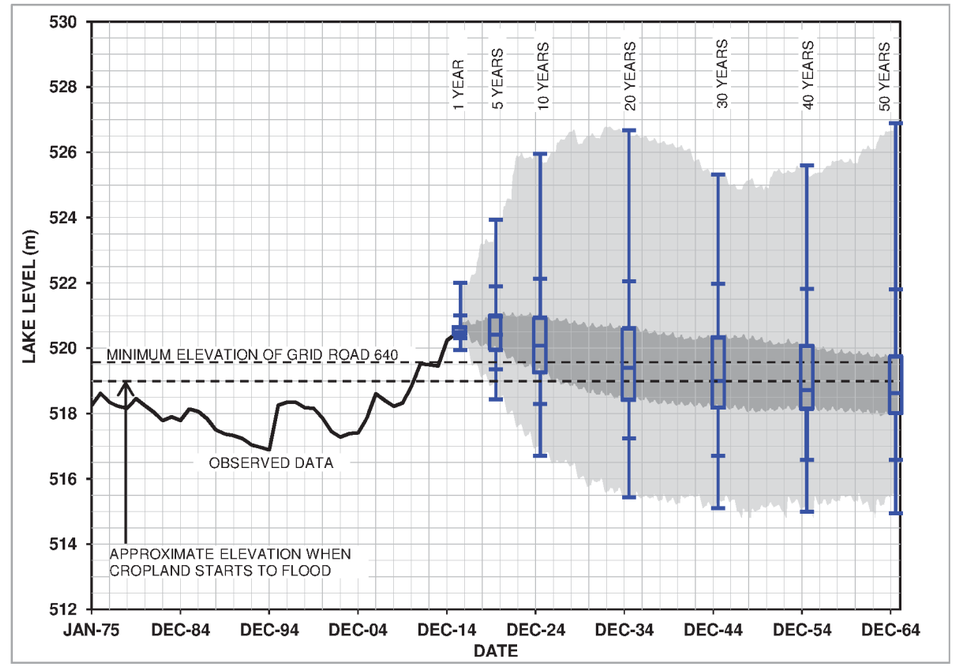
NOVEMBER 2016 | PLATE 10 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Inflow Kuwagan Creek Diversion\Flood Mitigation Options-Kutawagan Creek DiversionV2.xlsm
11"x17" PLOT SCALE 1:1

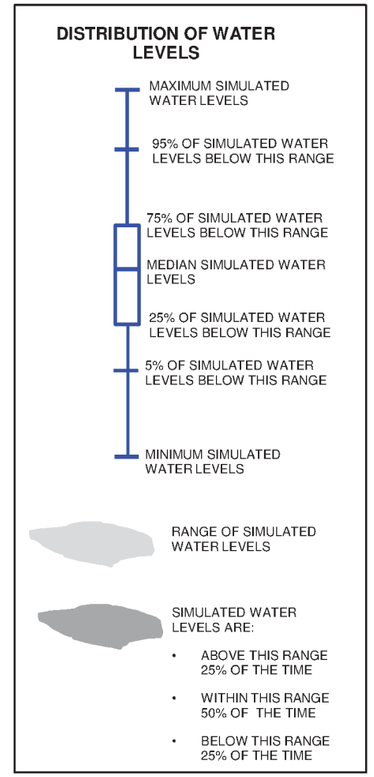
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

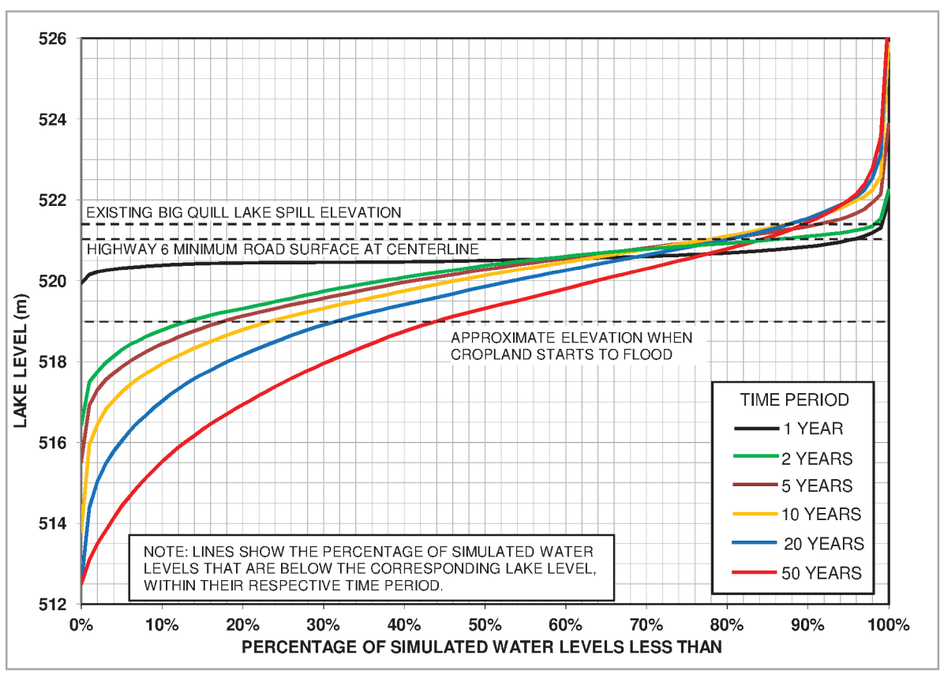


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

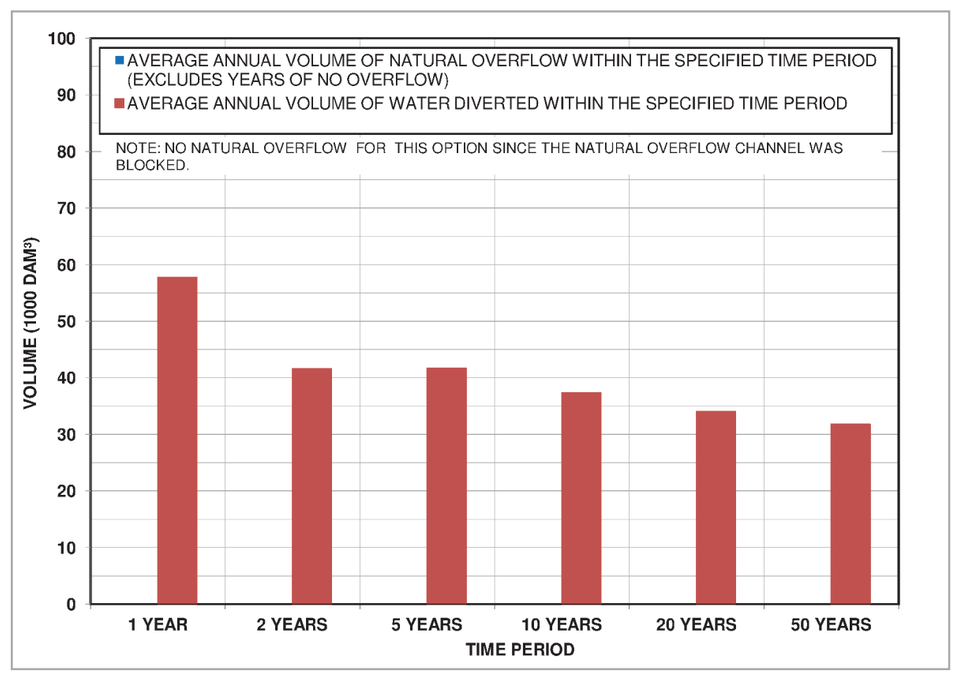


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

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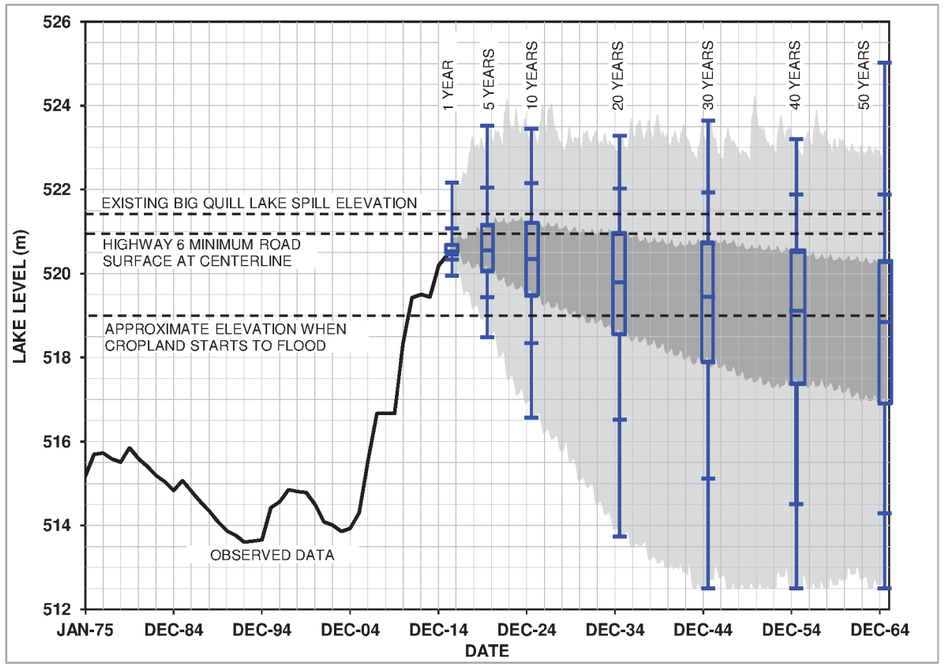
QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
KUTAWAGAN CREEK AND HIGHWAY 16 AREA DIVERSION OPTION

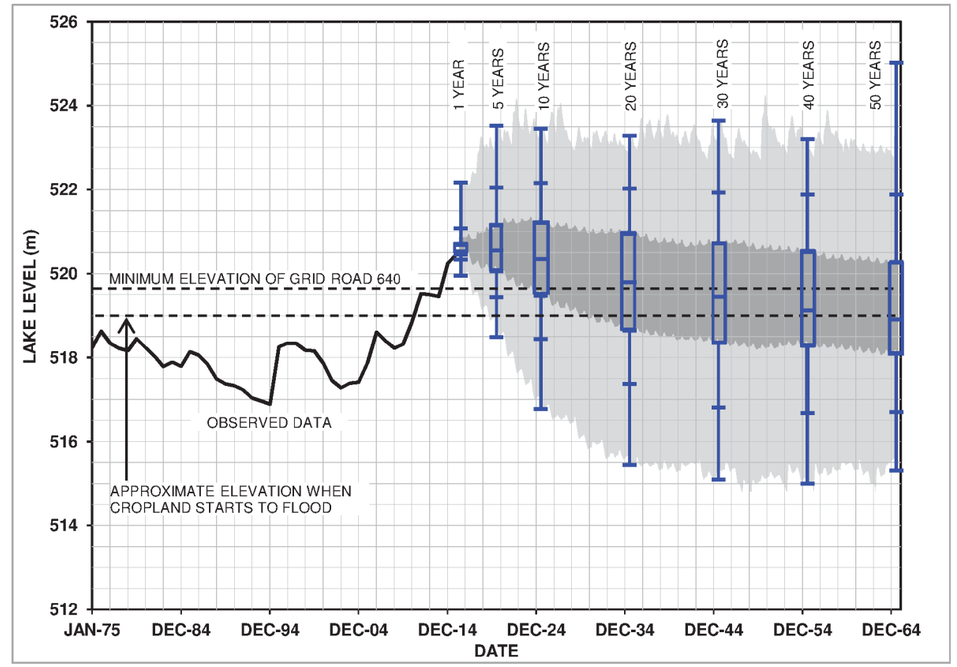
NOVEMBER 2016 | PLATE 11 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Inflow Kuwagan Creek Diversion\Flood Mitigation Options-Kutawagan Creek +Hwy16 Area
11"x17" PLOT SCALE 1:1

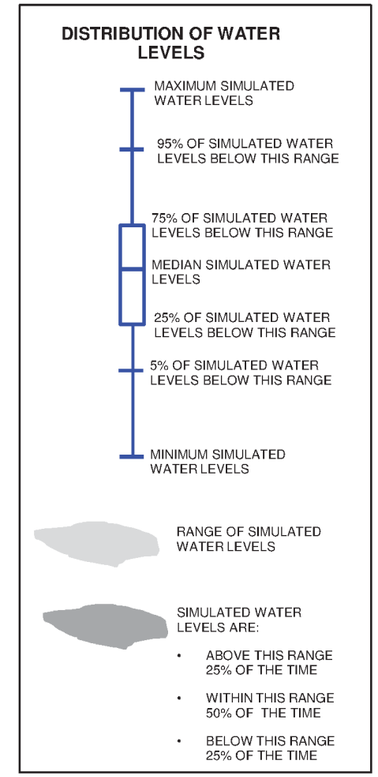
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

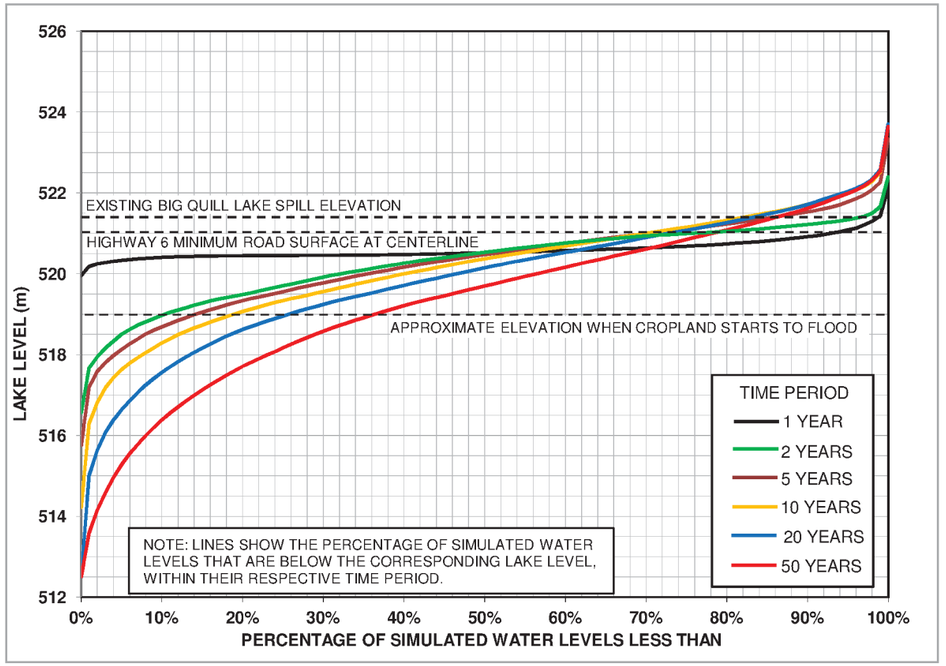


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

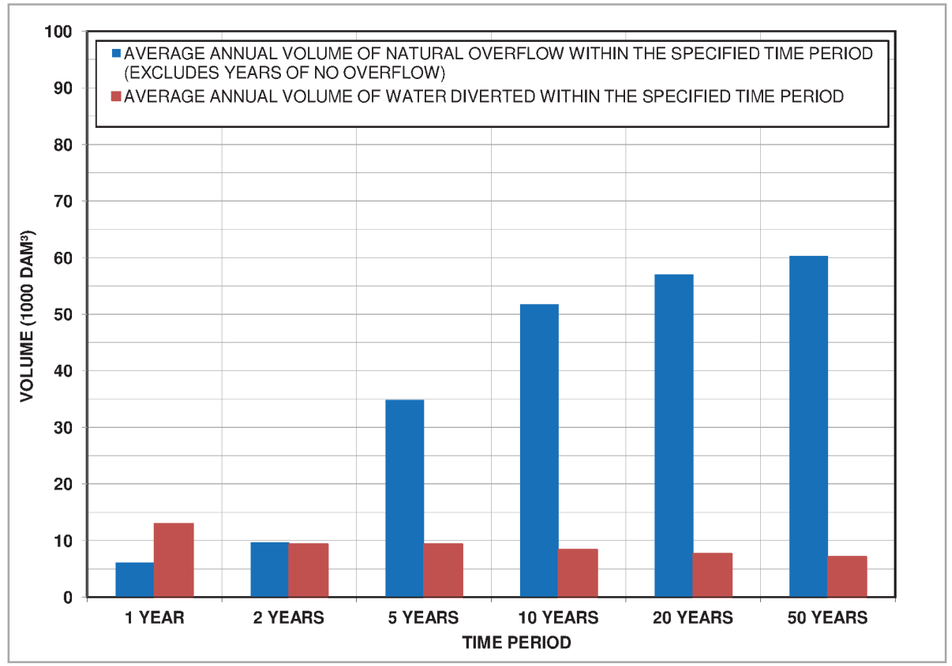


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

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1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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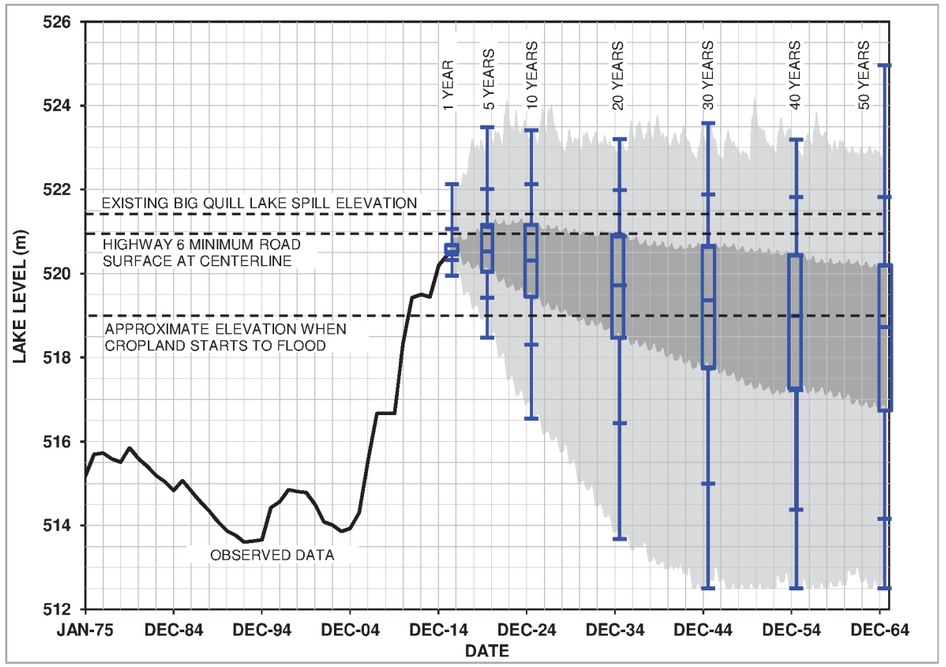
QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
JANSEN LAKE DIVERSION OPTION

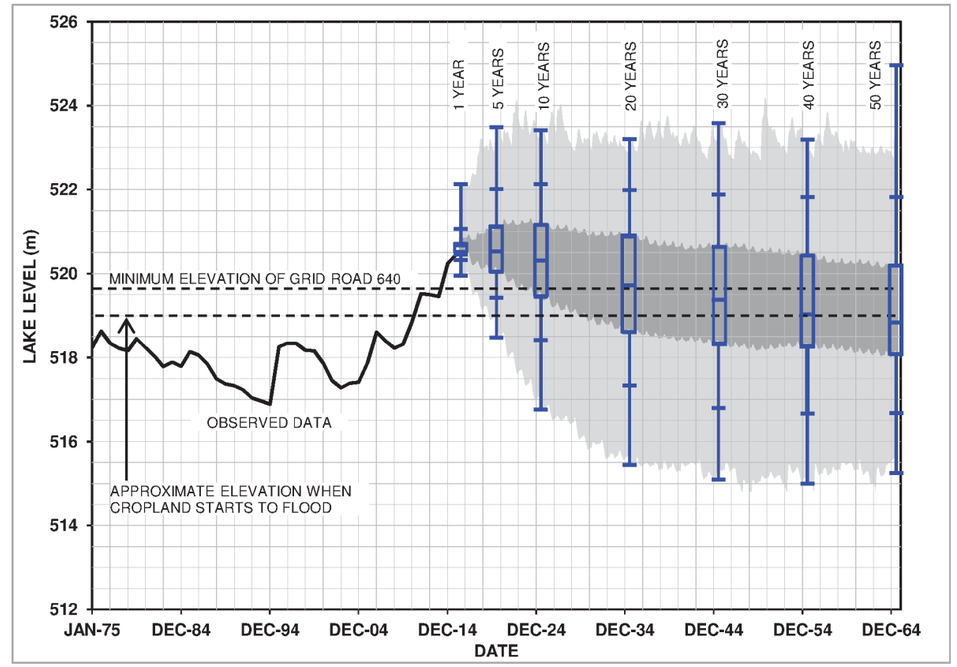
NOVEMBER 2016 | PLATE 12 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options-Jansen Lake Diversion\Inflow Diversion\Jansen Lake Diversion\Flood Mitigation Options-Jansen Lake DiversioN V2.xlsm
11"x17" PLOT SCALE 1:1

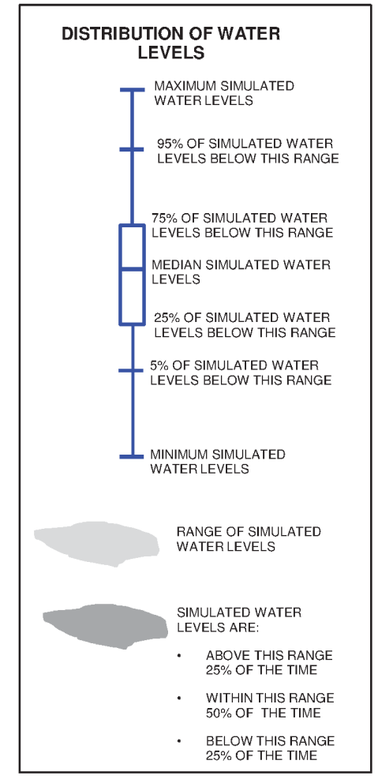
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

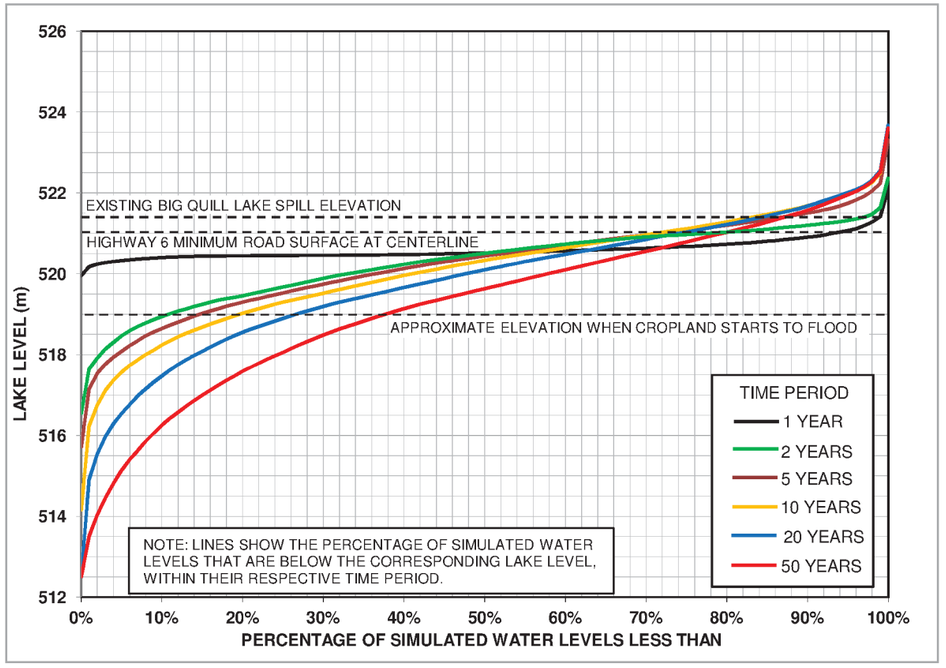


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

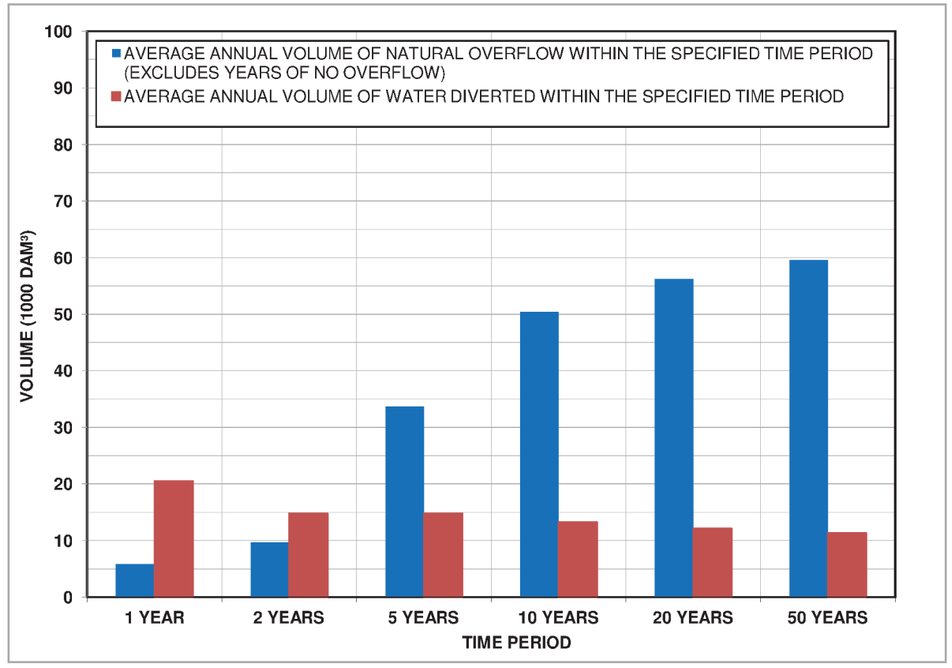


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
JANSEN LAKE AND ROMANCE CREEK DIVERSION OPTION

NOVEMBER 2016 | PLATE 13 | REV: 0

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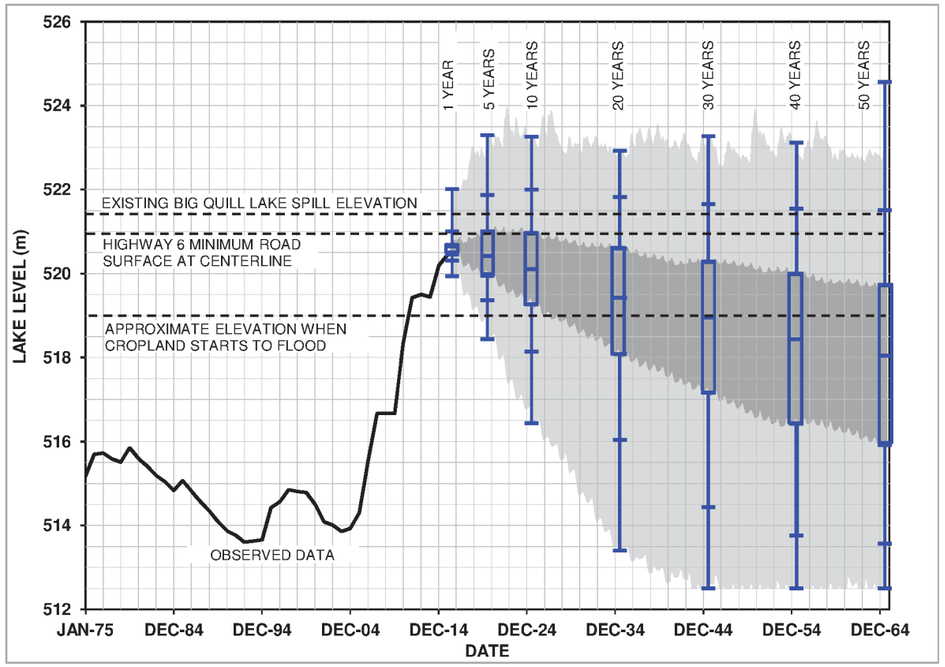
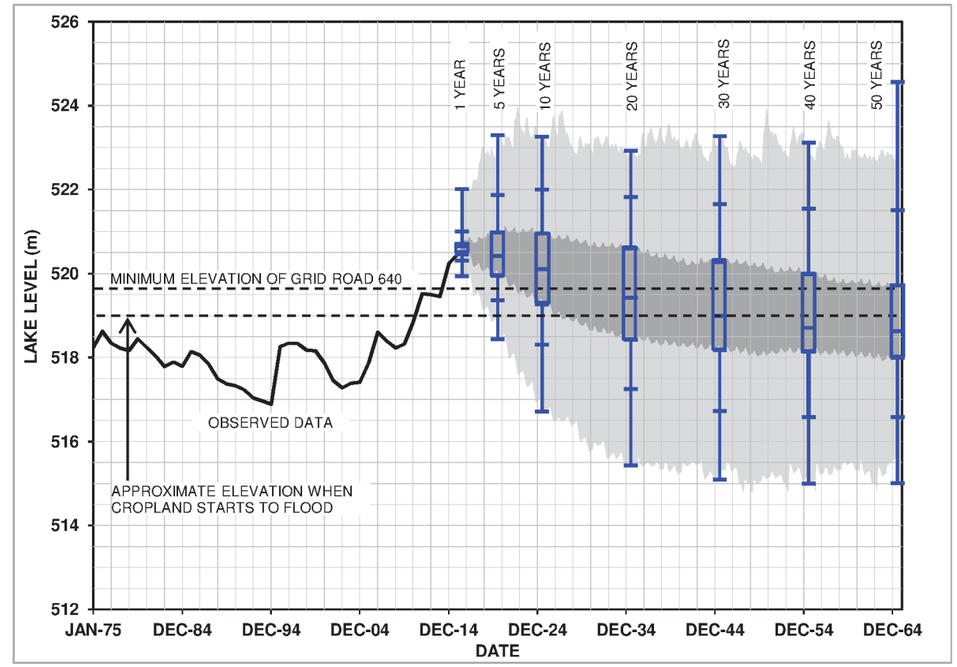
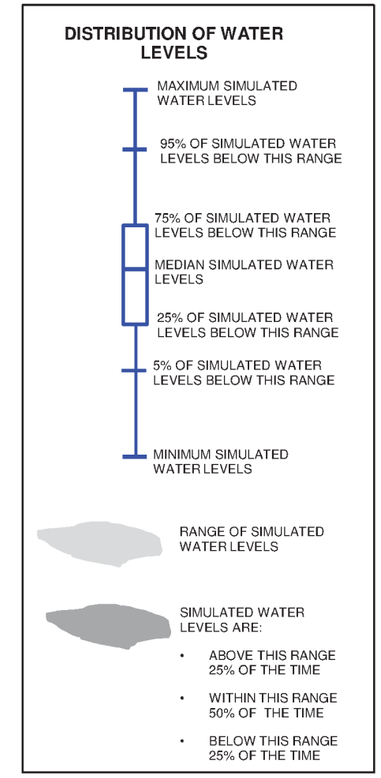
11"x17" PLOT SCALE 1:1

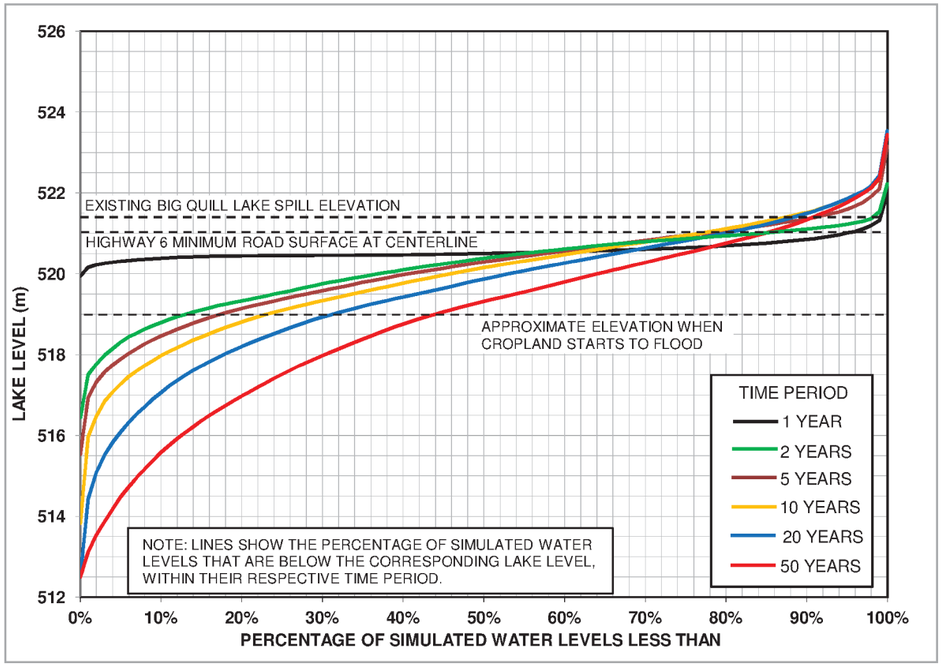


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

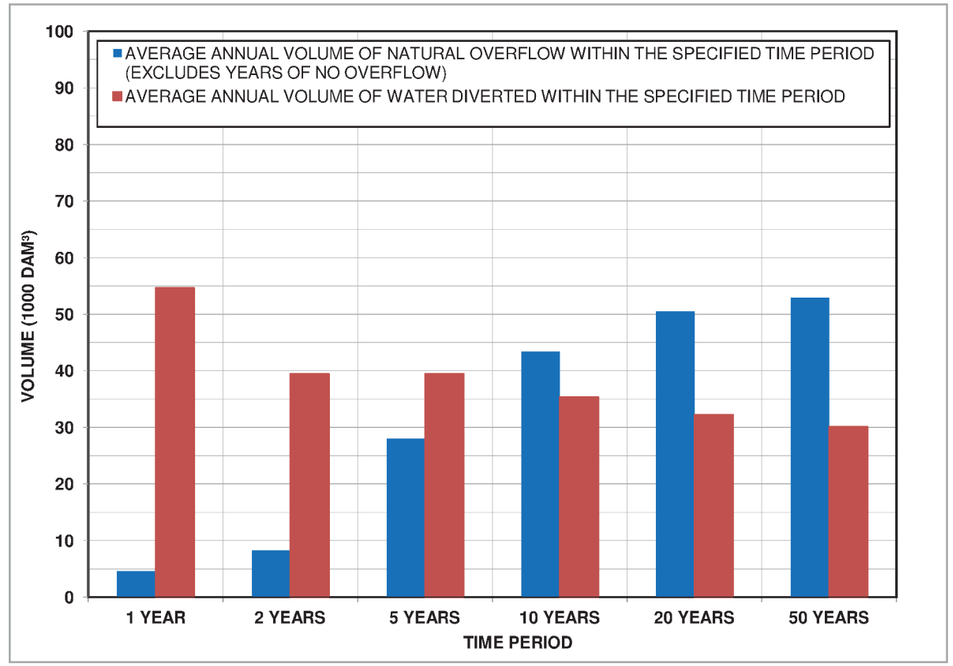


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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Water Security Agency

QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
JANSEN LAKE, ROMANCE CREEK AND IRONSPRING CREEK DIVERSION OPTION

NOVEMBER 2016 | PLATE 14 | REV: 0

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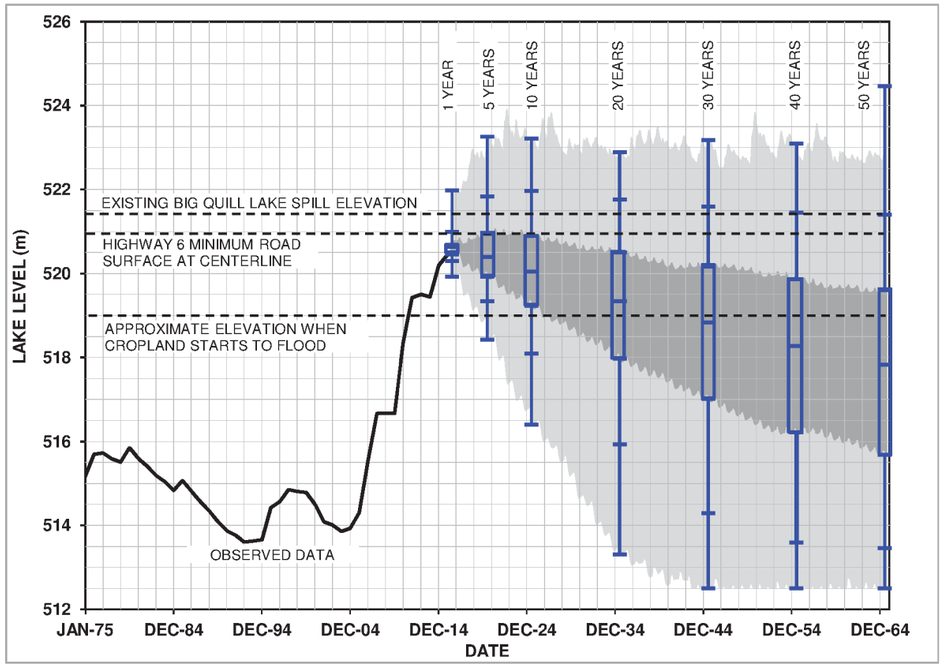
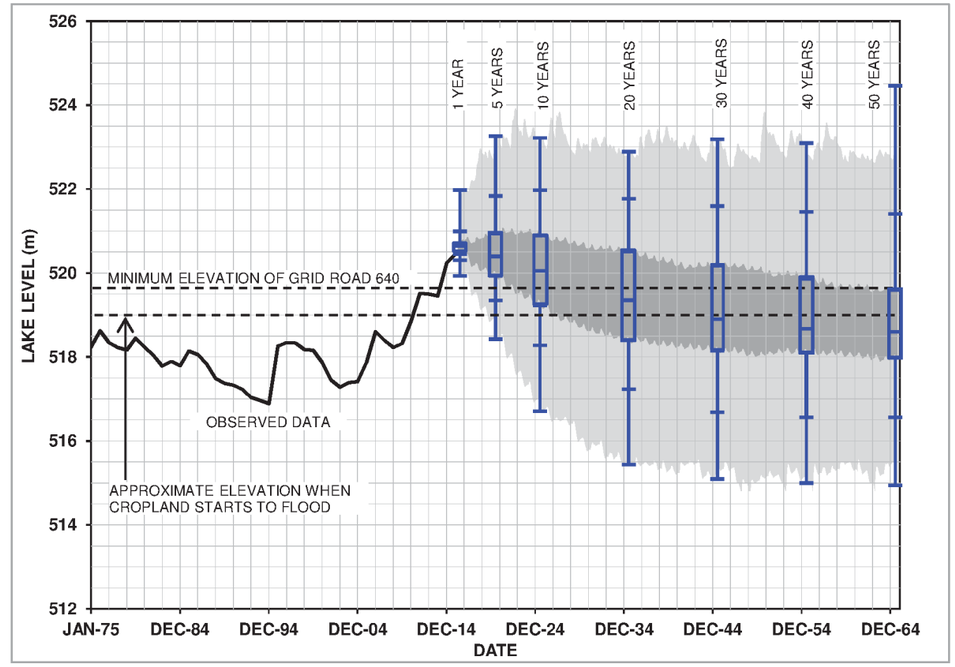
FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options-Jansen+Romance +Ironspring Diversion\Inflow Diversion\Ironspring Creek Diversion\Flood
11"x17" PLOT SCALE 1:1

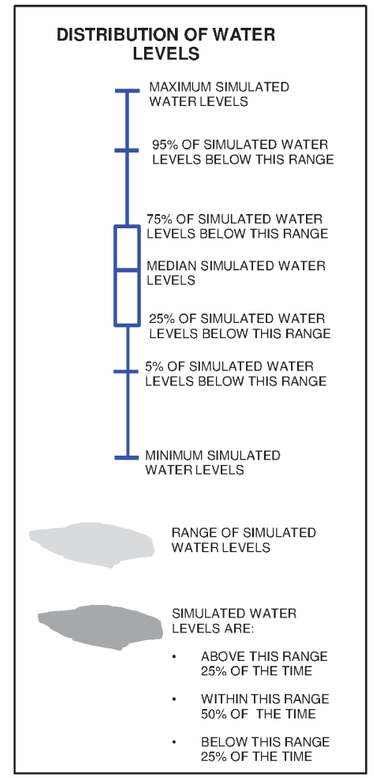
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

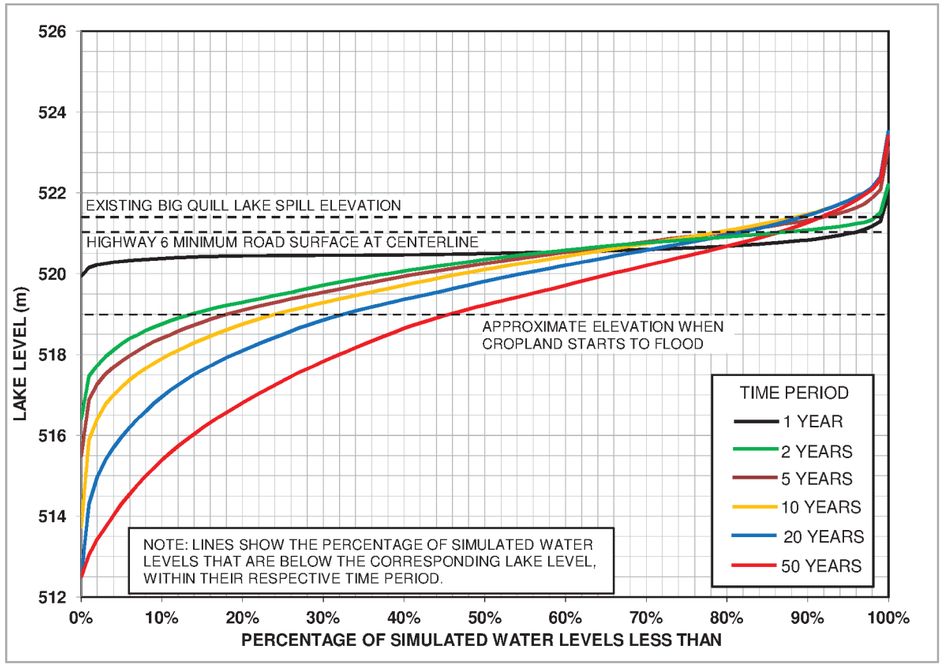


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

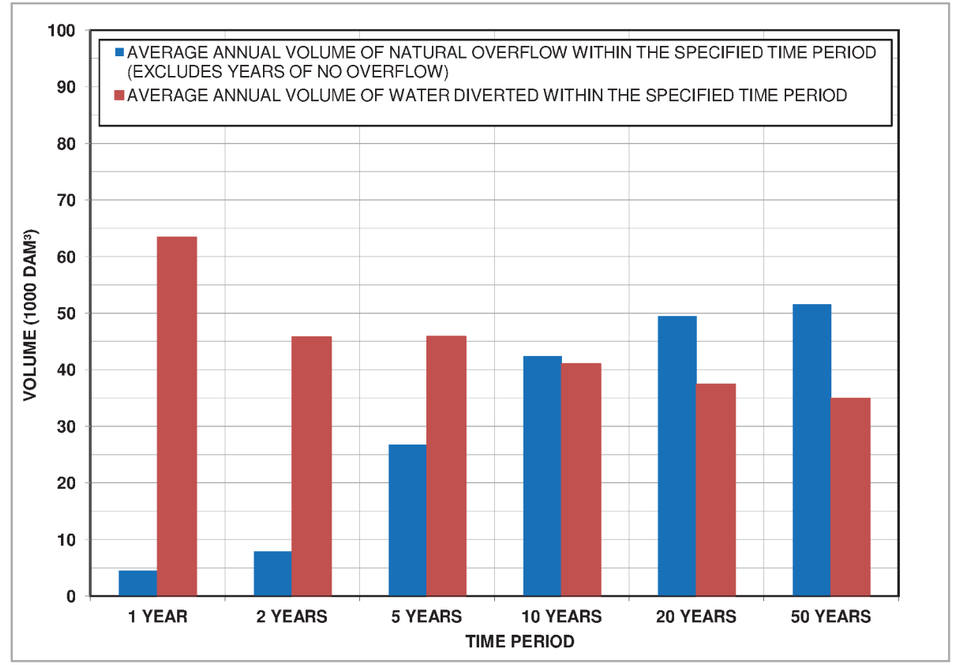


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
JANSEN LAKE, ROMANCE, IRONSPRING AND WIMMER BROOK DIVERSION OPTION

NOVEMBER 2016 | PLATE 15 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options-Wimmer Brook Diversion V2.xlsm
11"x17" PLOT SCALE 1:1

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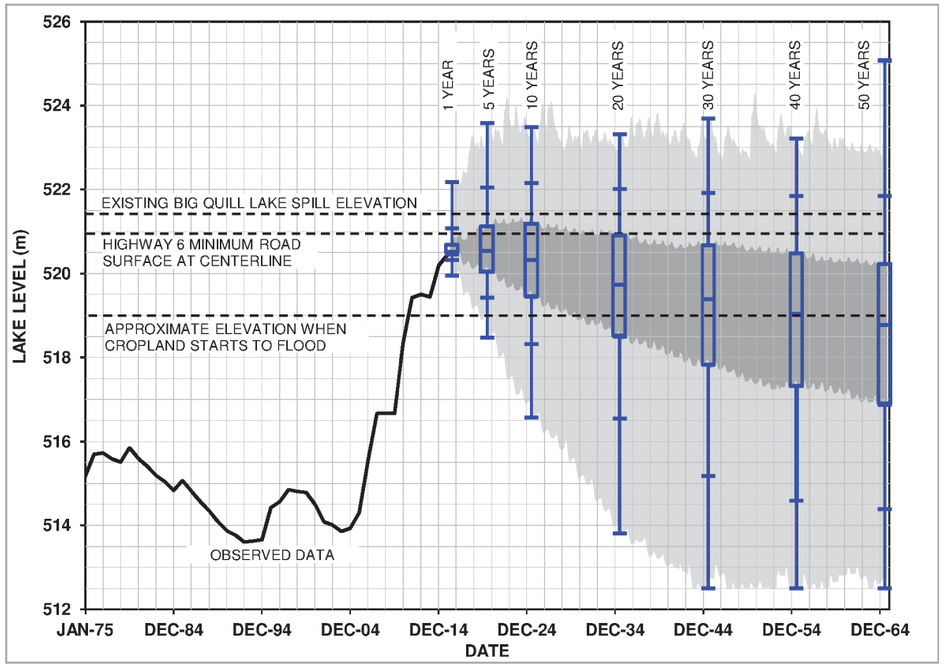
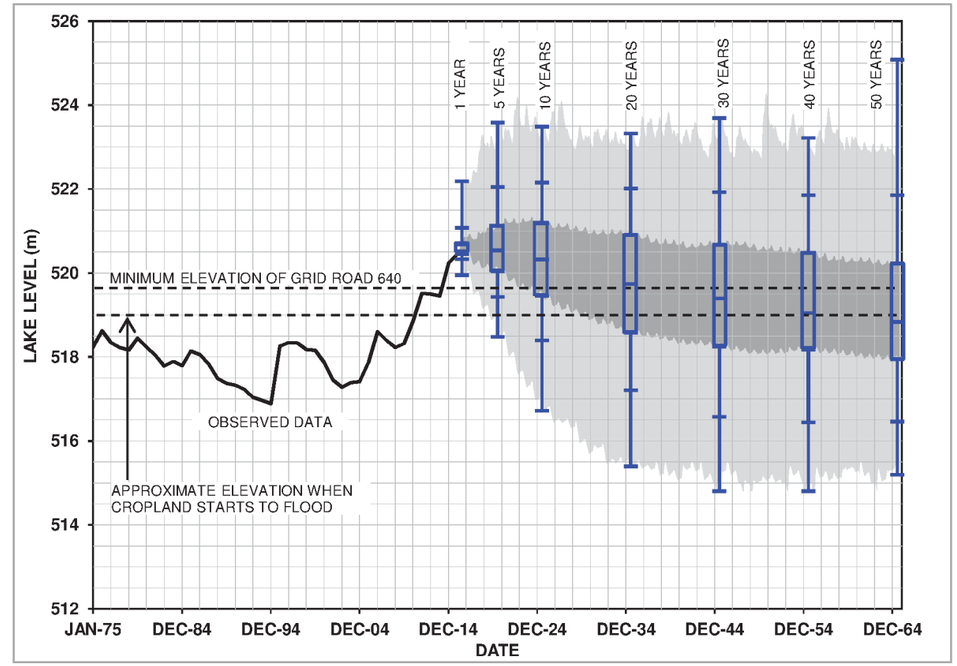
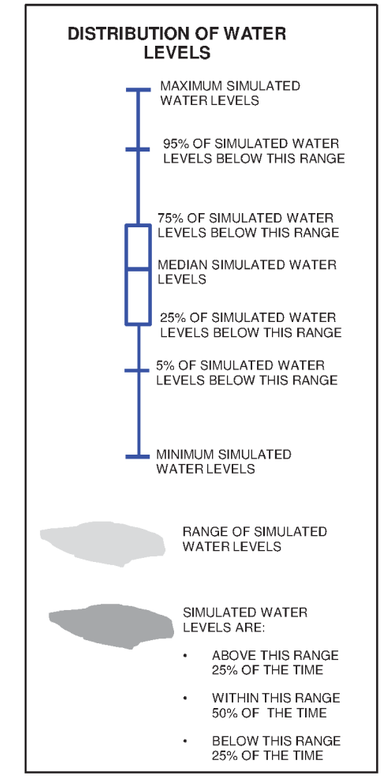
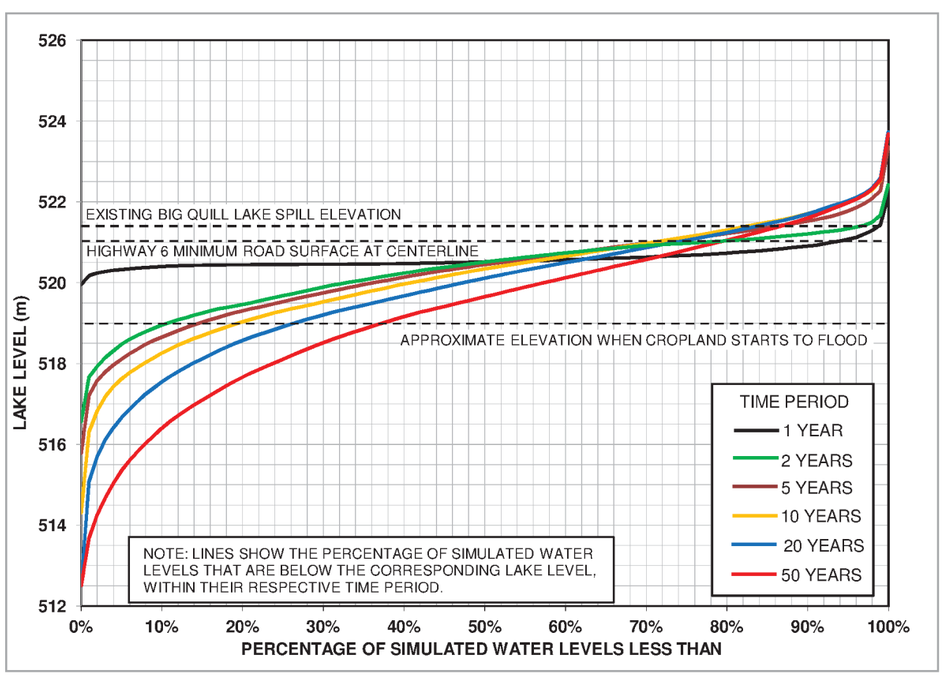


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

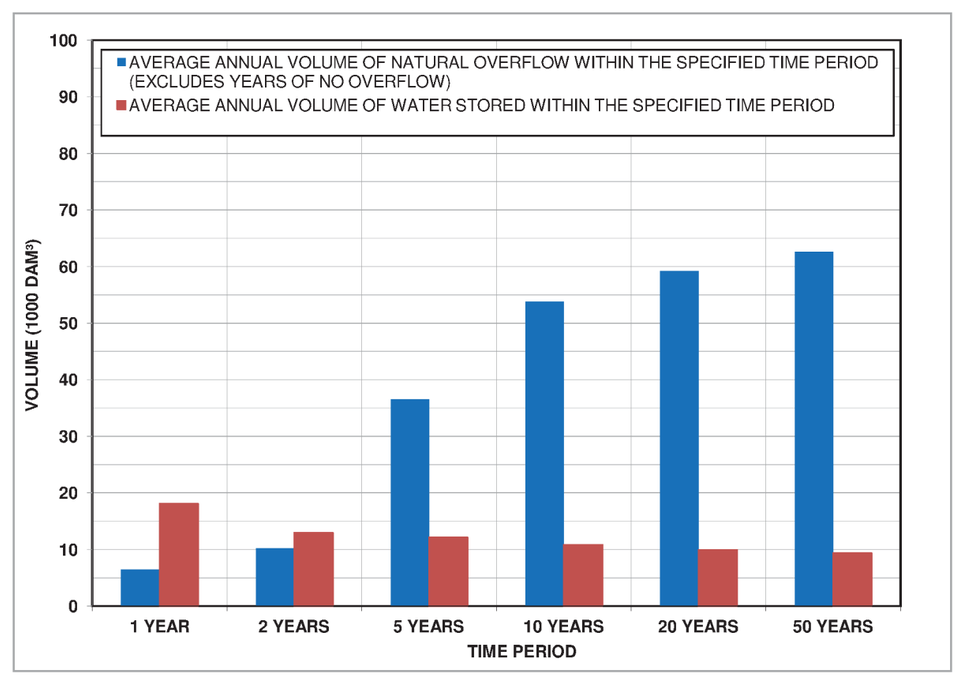


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
PONASS LAKE STORAGE OPTION

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FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Upland Storage\Flood Mitigation Options-Upland Storage Ponass Lakes V2.xlsm
11"x17" PLOT SCALE 1:1

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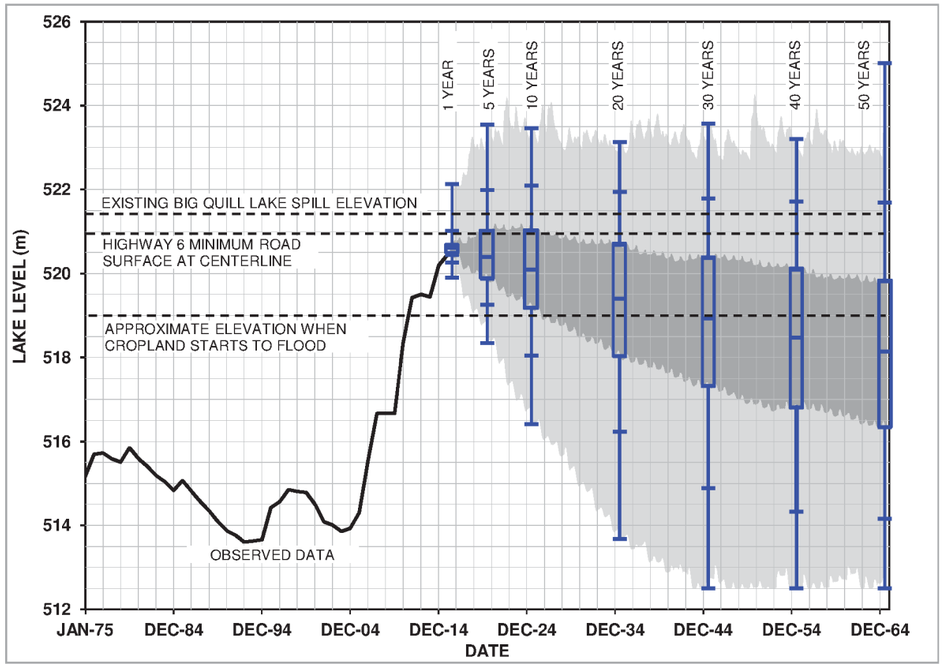
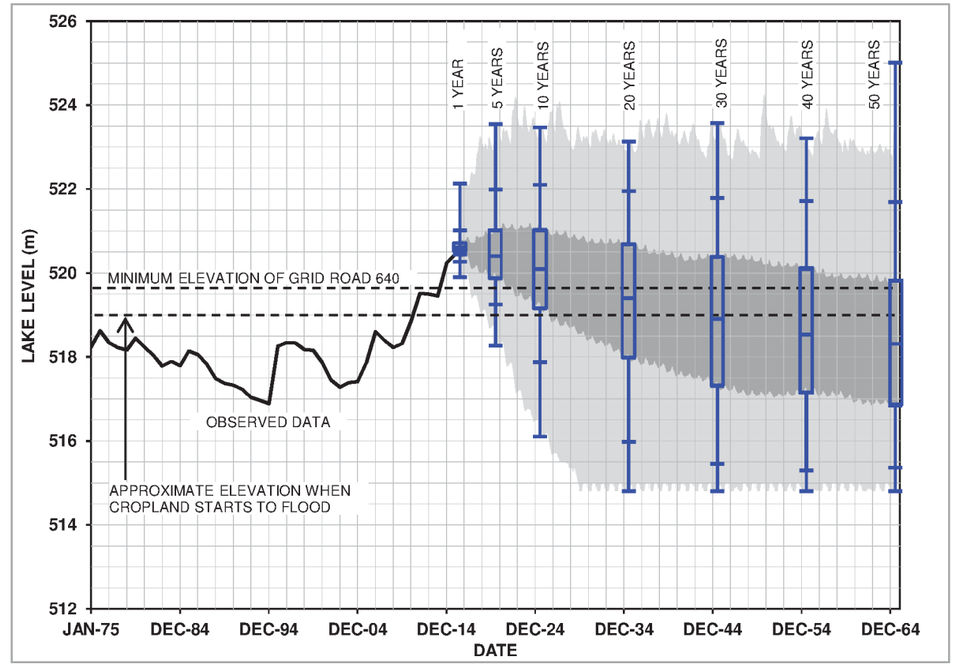
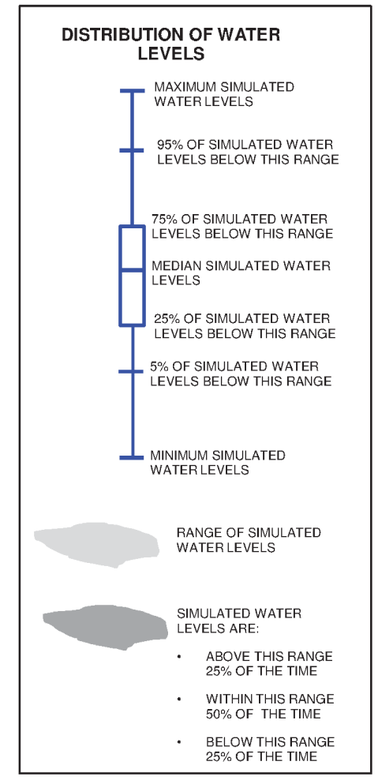
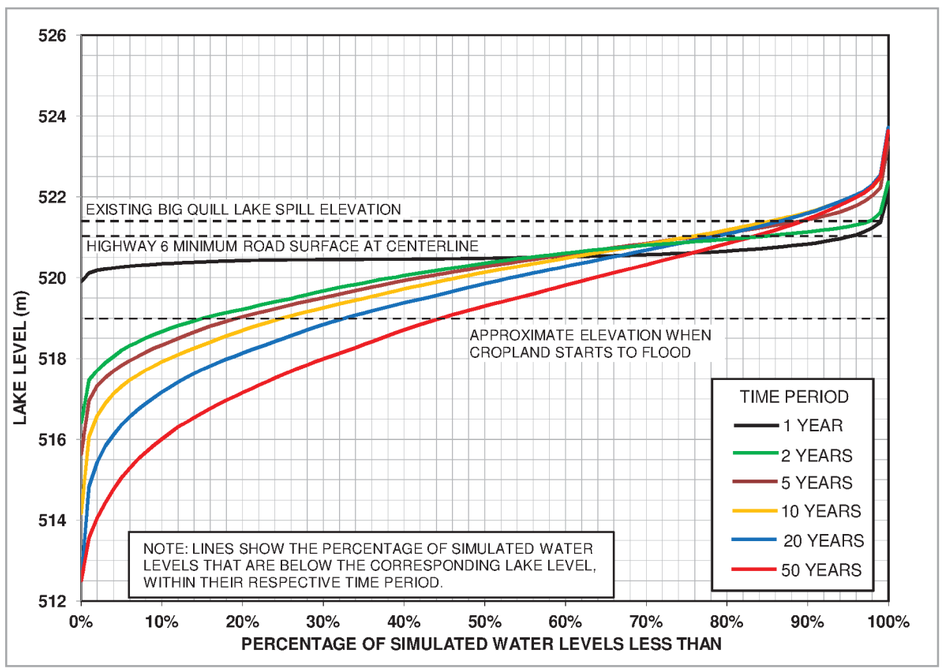


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

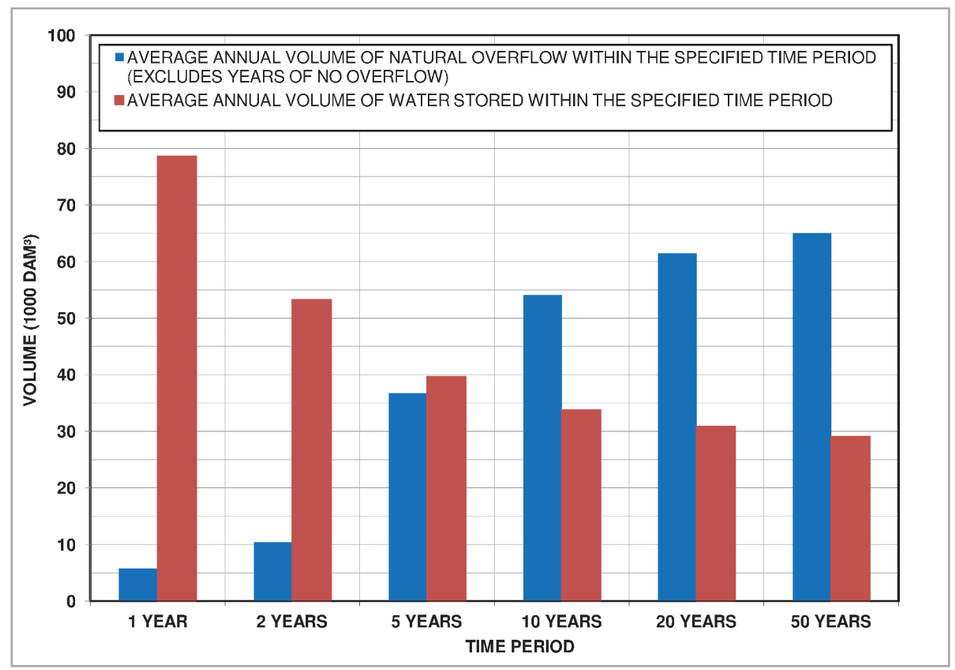


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
OTHER STORAGE OPTION

NOVEMBER 2016 | PLATE 17 | REV: 0

FileNameP:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Upland Storage\Flood Mitigation Options-Upland Storage Others Opt 2 V2.xlsm
11"x17" PLOT SCALE 1:1

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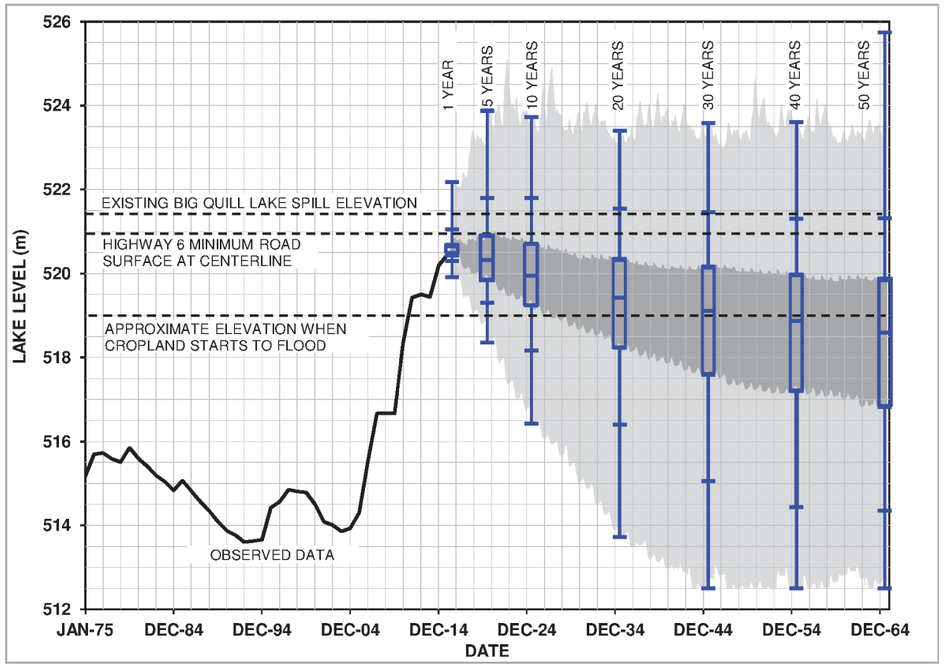
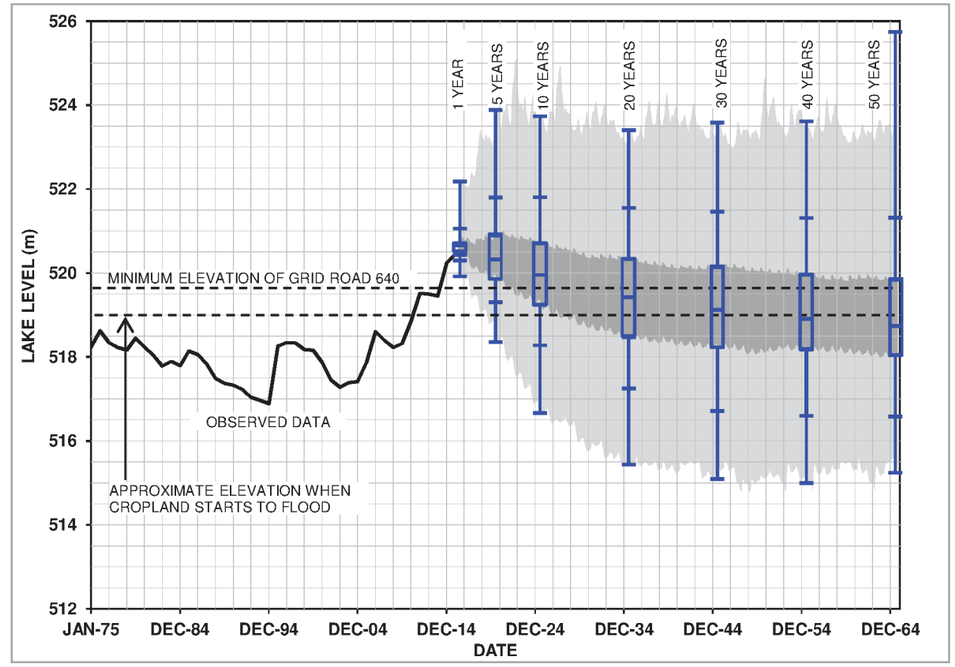
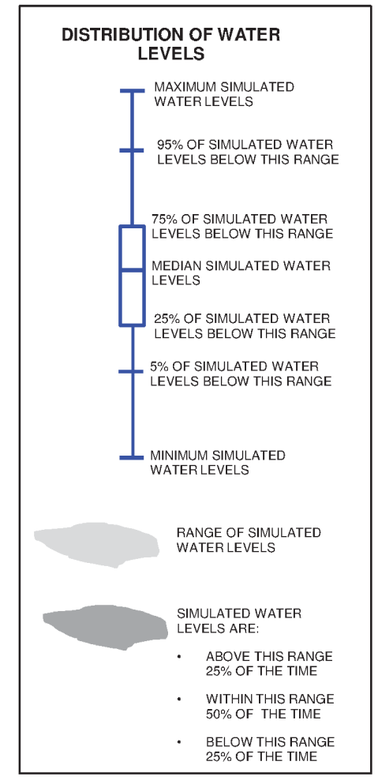
ALL RIGHTS RESERVED

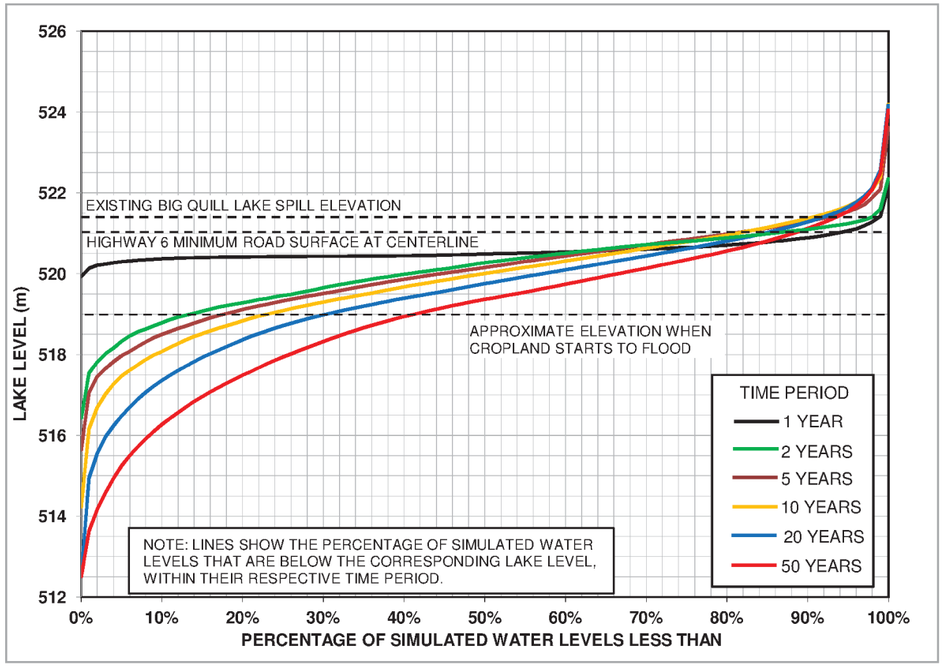


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

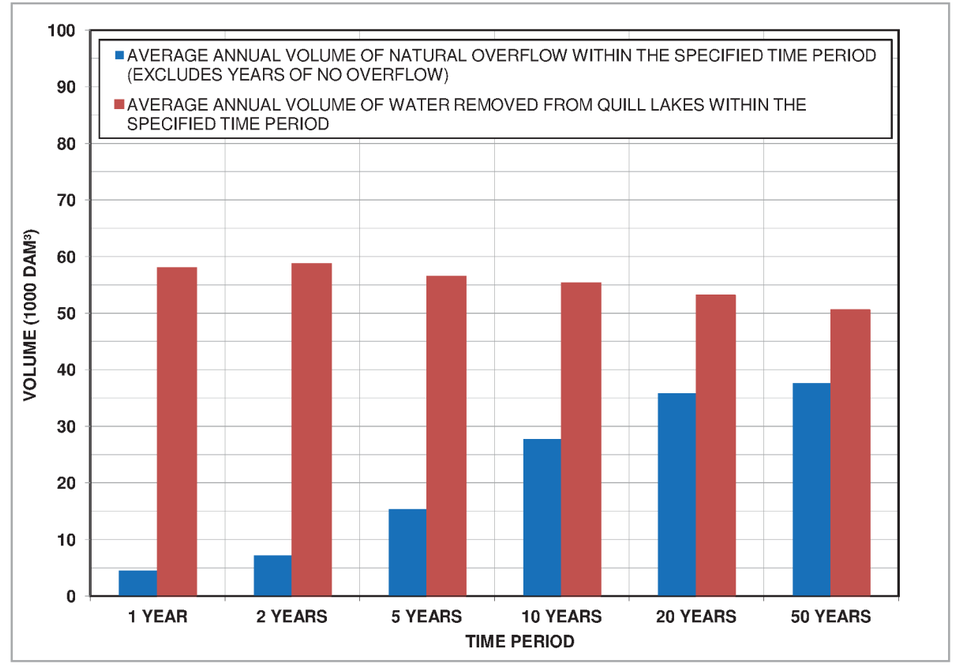


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
LANDOWNER PROPOSAL (PLAN B) OPTION

NOVEMBER 2016 | PLATE 18 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Removal of Water\Landowner Proposal (Plan B)\Flood Mitigation Options-Plan B Rev B.xlsm
11"x17" PLOT SCALE 1:1

DATA PRODUCED BY KGS GROUP.
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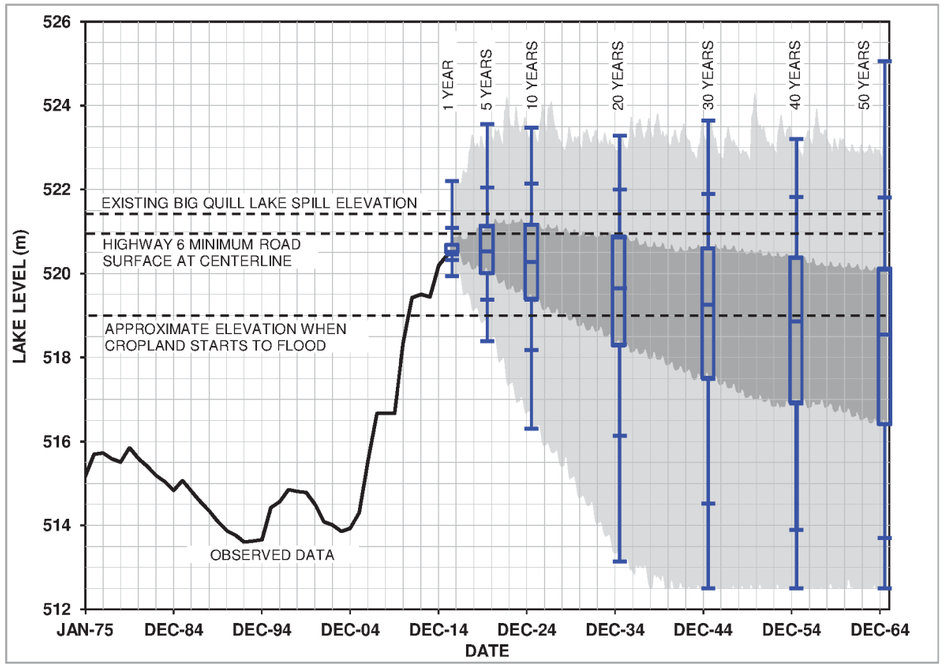
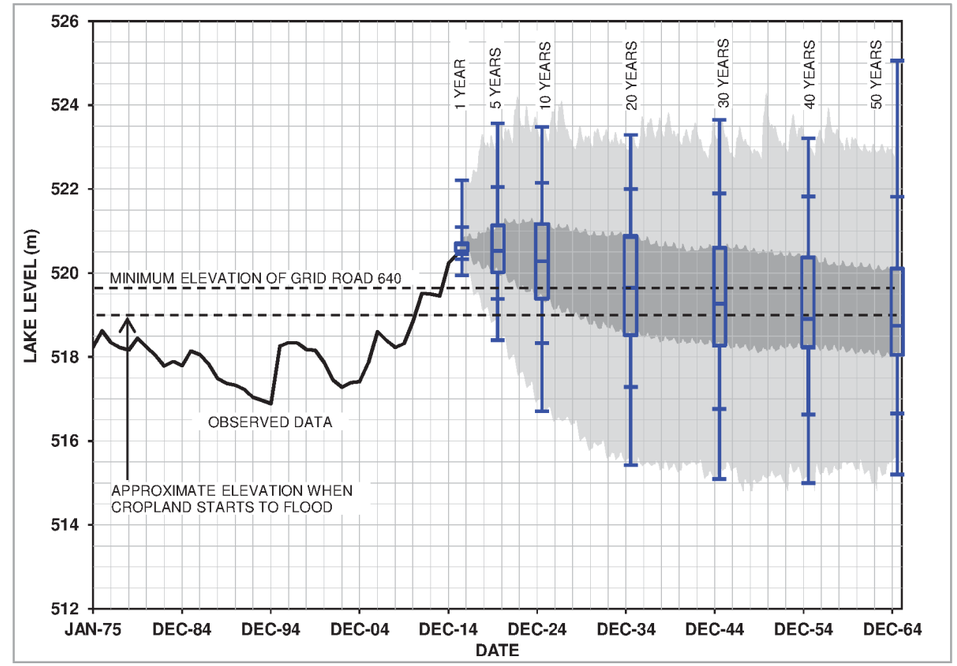
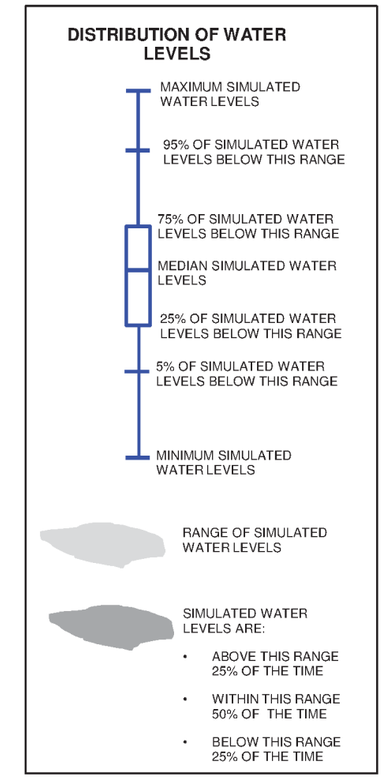
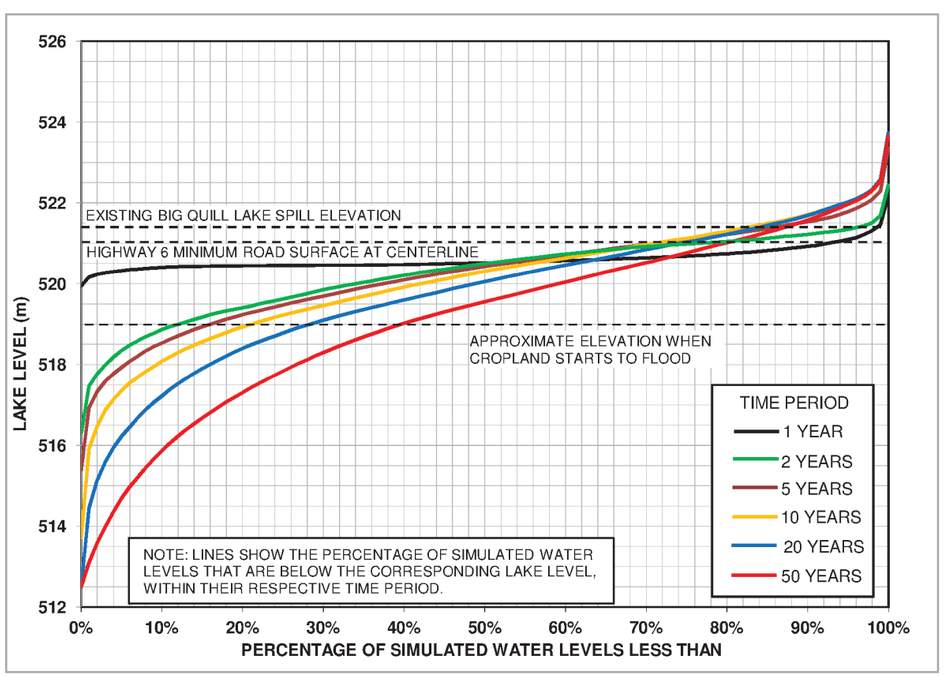


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

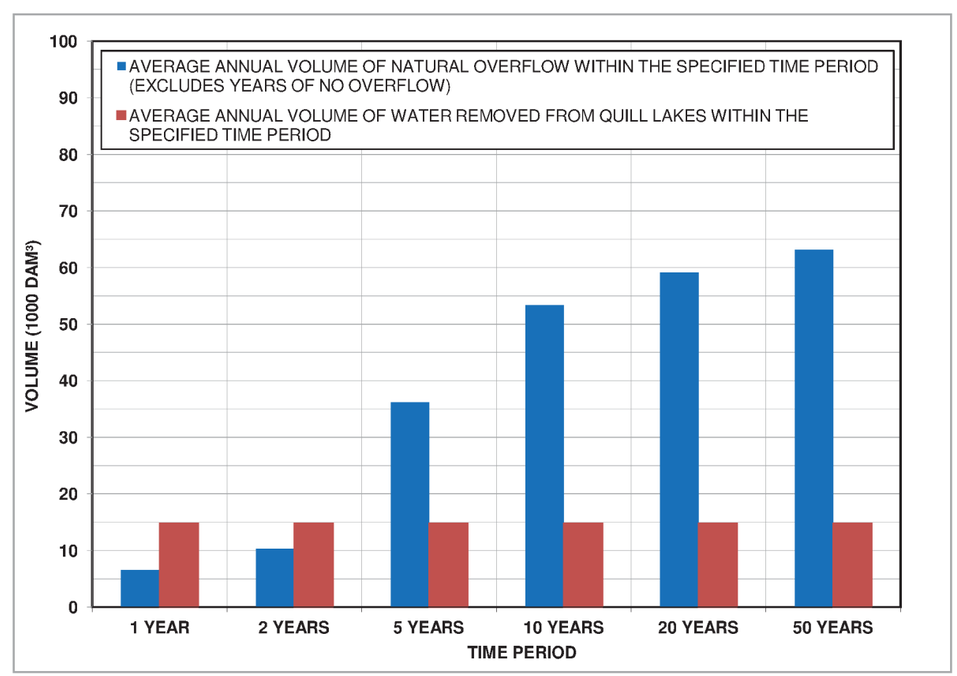


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
DEEP WELL INJECTION OPTION
(Q = 0.47 m^3/s)

NOVEMBER 2016 | PLATE 19 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Removal of Water\Pump and Treat Water\Option 1\Flood Mitigation Options-Pump and Treat Opt1
11"x17" PLOT SCALE 1:1

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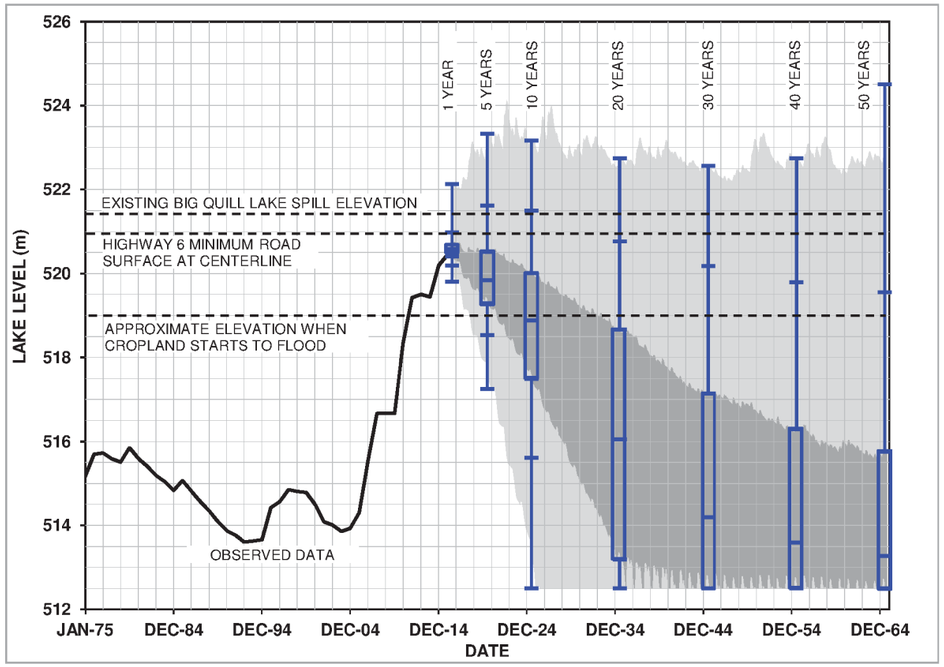
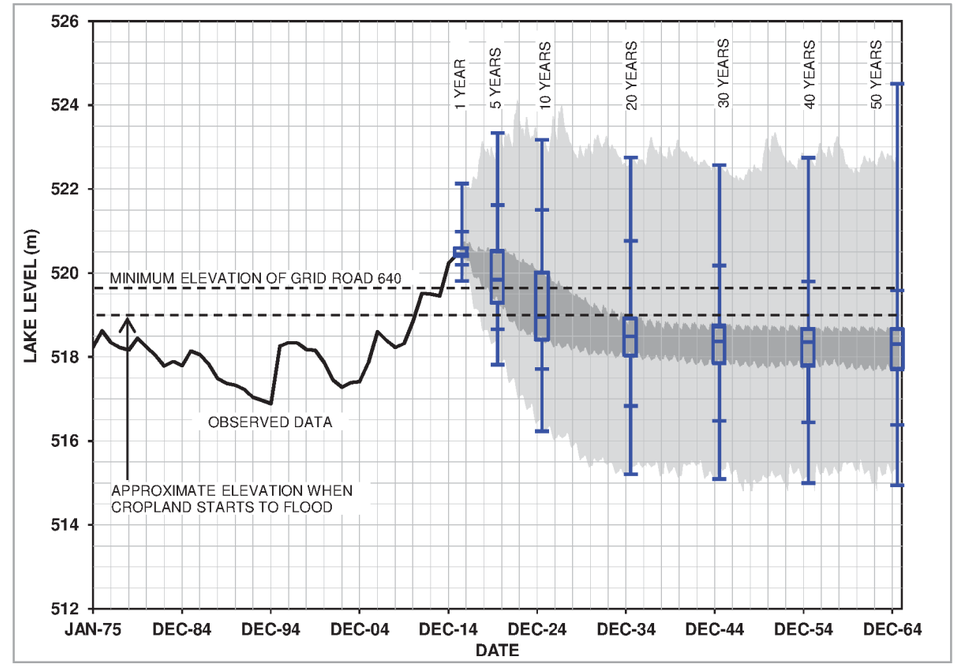
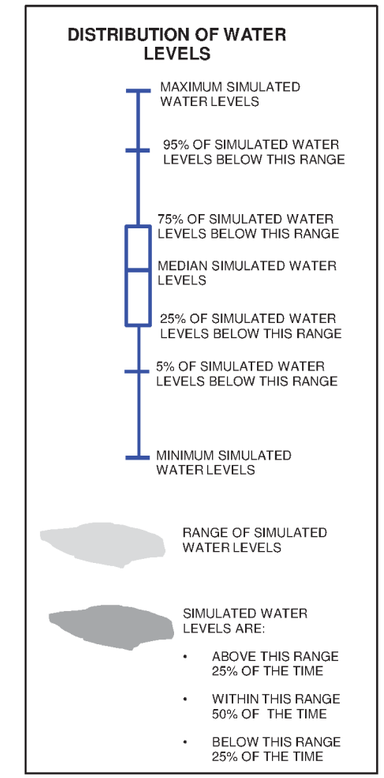
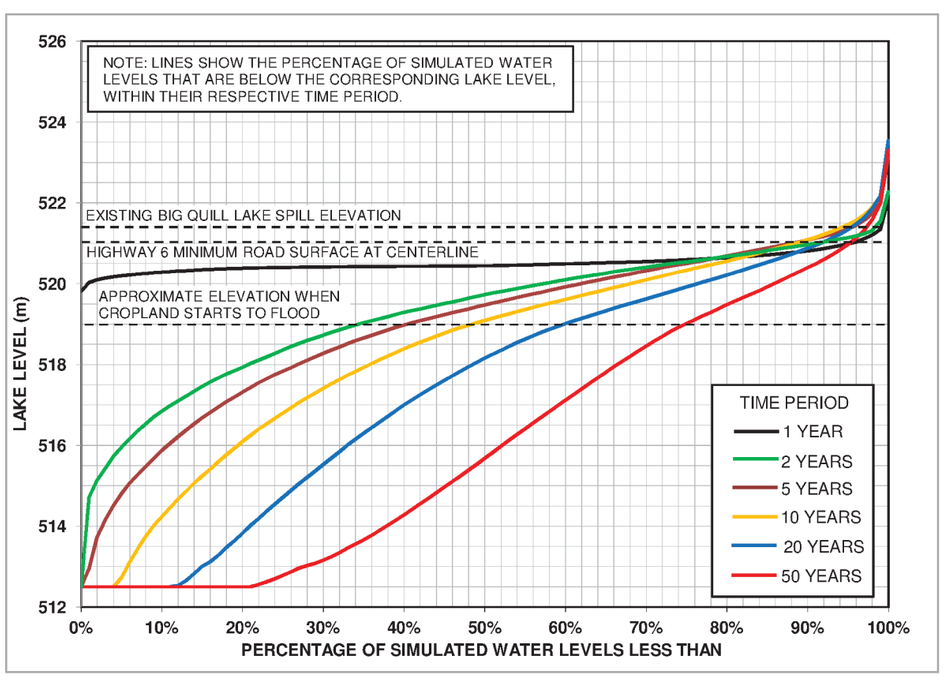


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

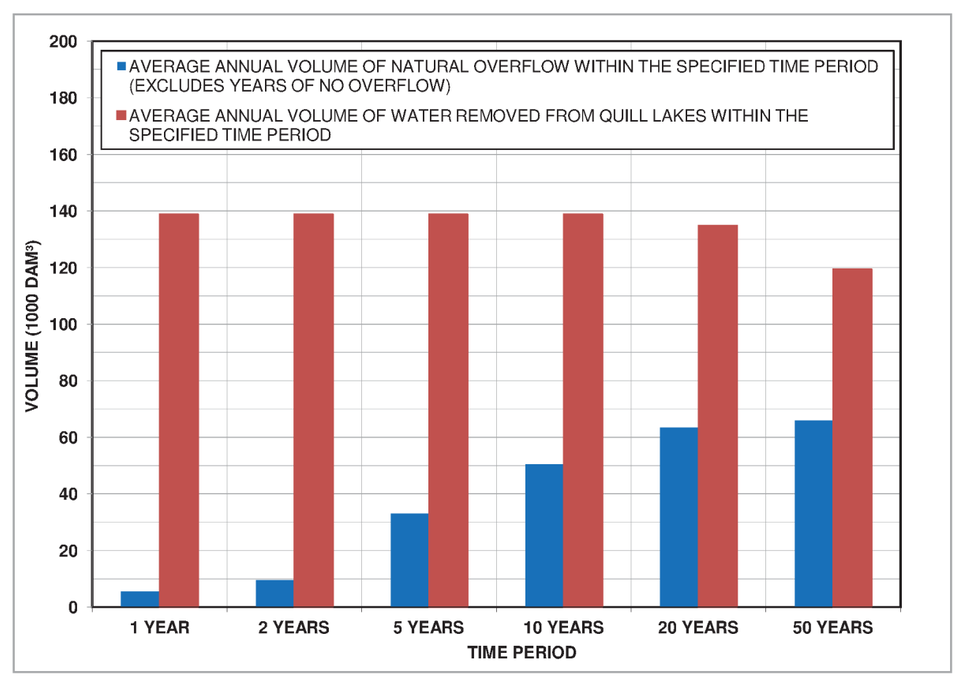


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
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Water Security Agency

QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
DEEP WELL INJECTION OPTION
(Q = 4.4 m³/s)

NOVEMBER 2016 | PLATE 20 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Removal of Water\Pump and Treat Water\Option 2\Flood Mitigation Options-Pump and Treat Opt2
11"x17" PLOT SCALE 1:1

DATA PRODUCED BY KGS GROUP.
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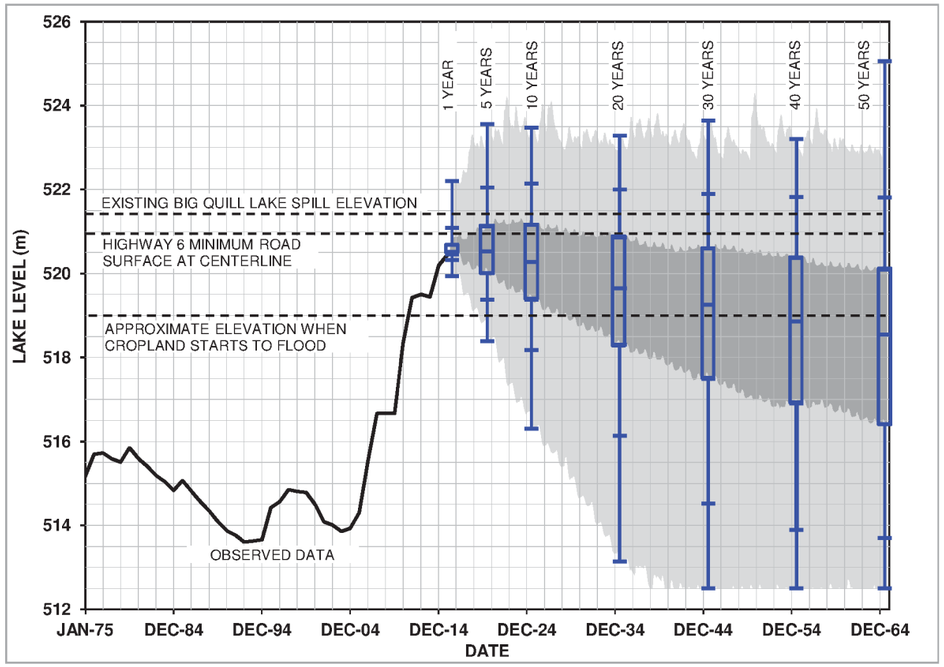
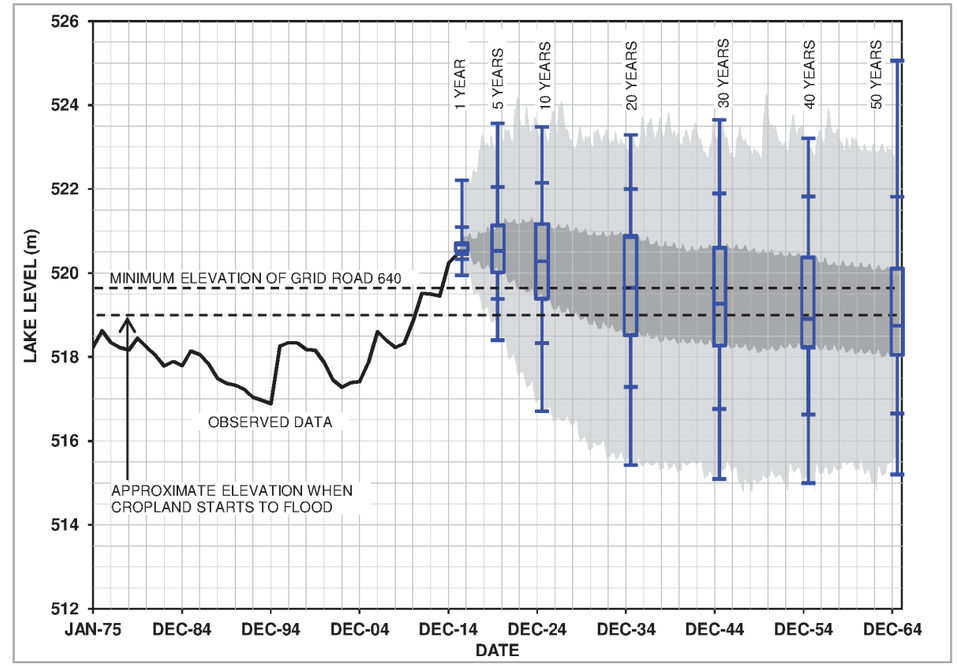
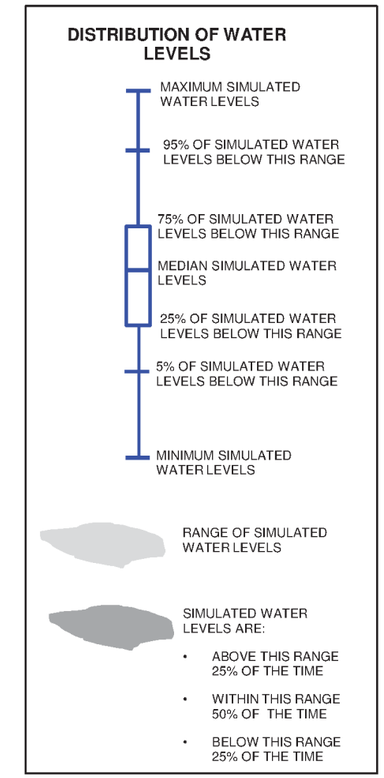
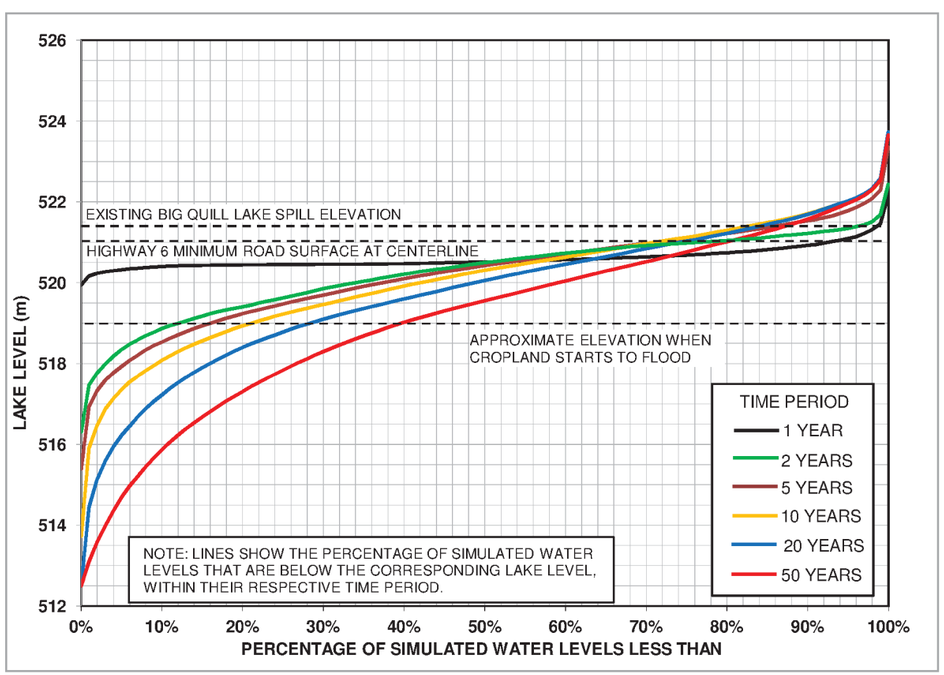


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

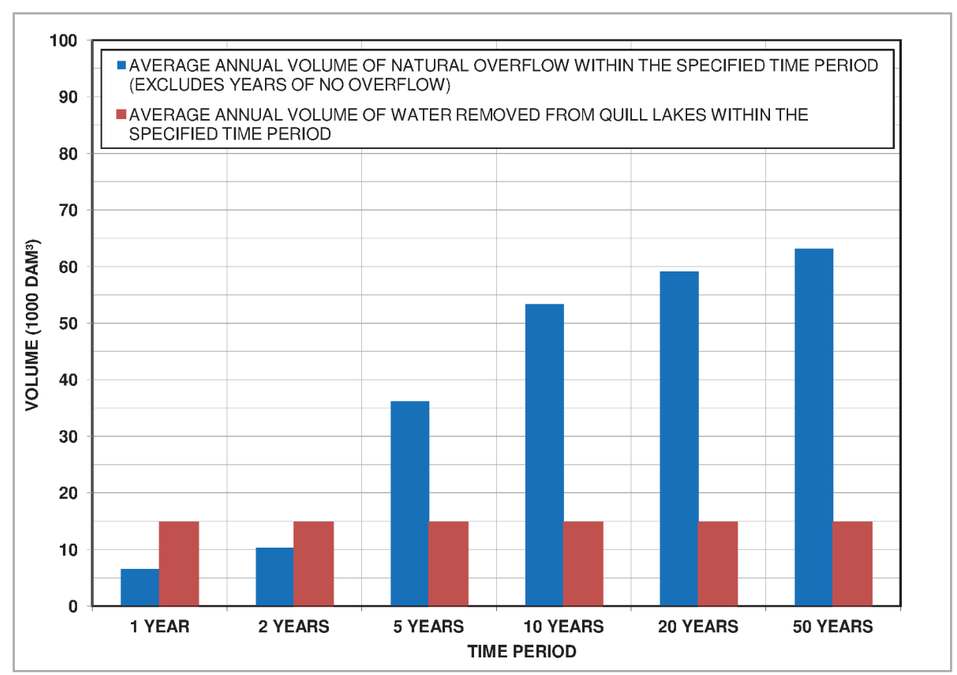


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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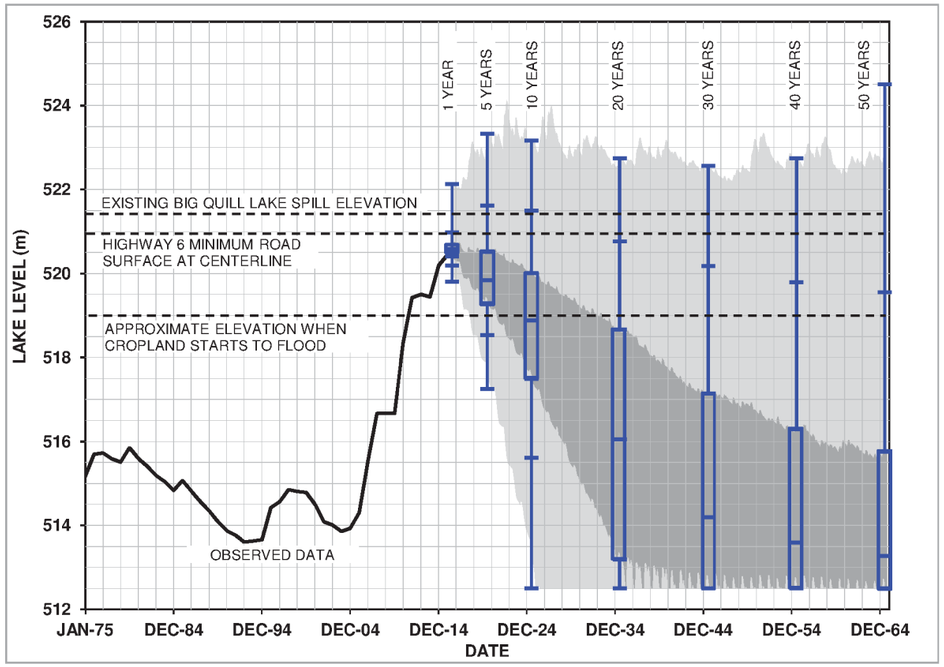
QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
PUMP WATER TO ANOTHER WATERSHED OPTION (Q = 0.47 m^3/s)

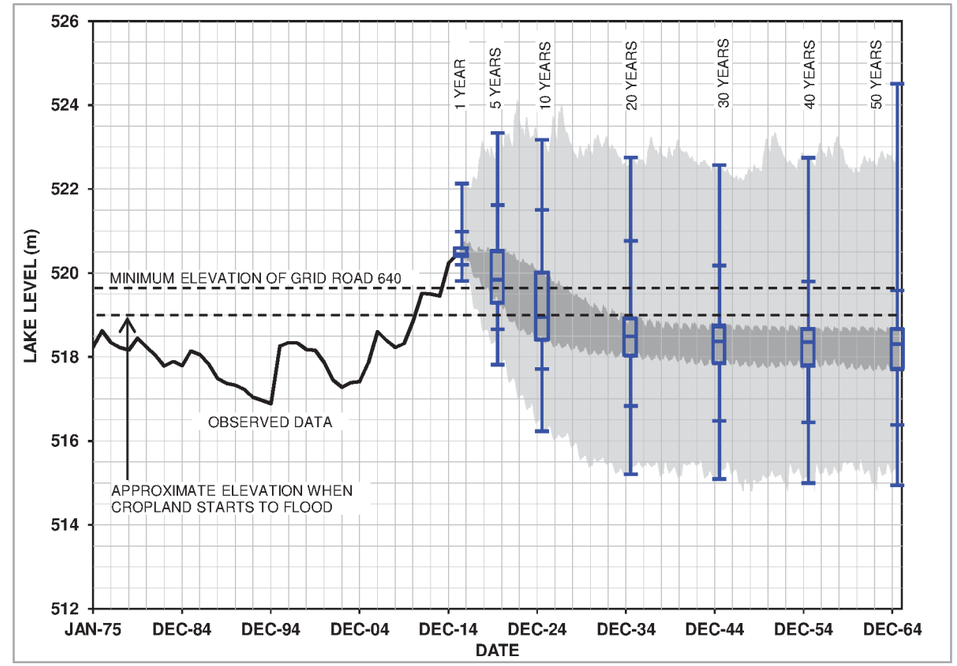
NOVEMBER 2016 | PLATE 21 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Removal of Water\Pump and Treat Water\Option 1\Flood Mitigation Options-Pump and Treat Opt1
11"x17" PLOT SCALE 1:1

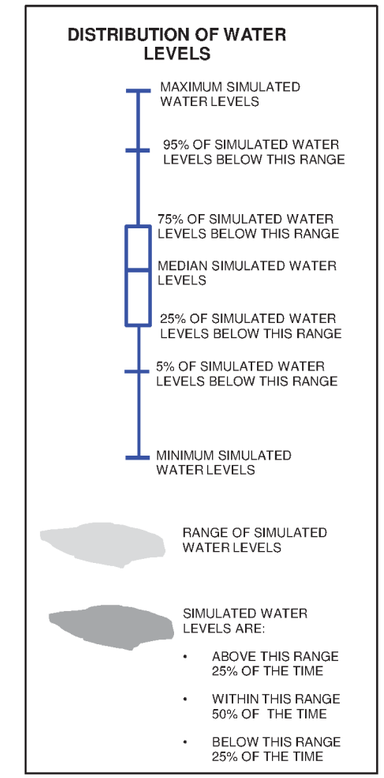
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

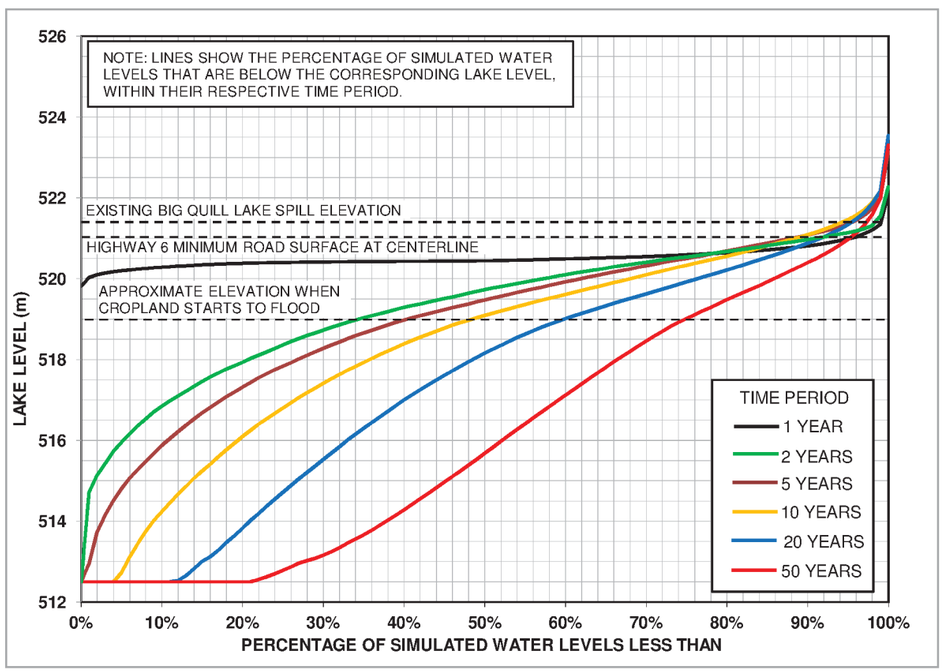


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

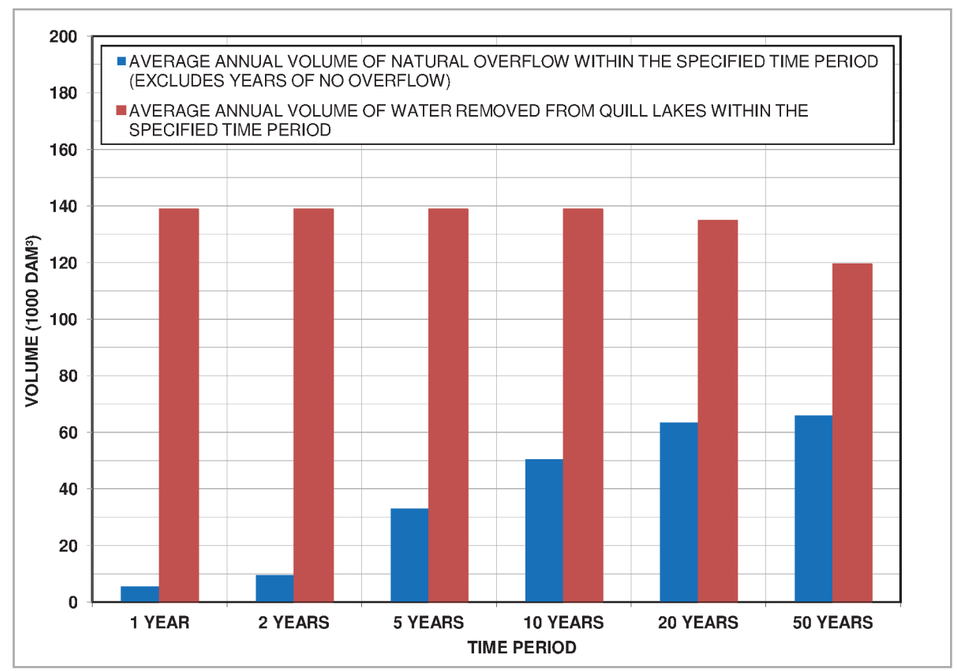


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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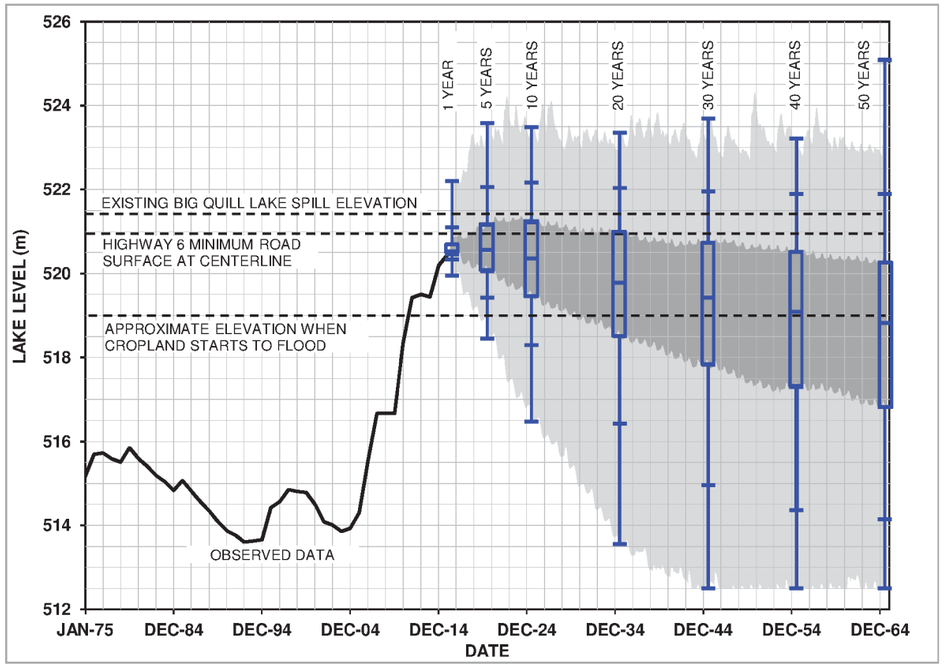
QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
PUMP WATER TO ANOTHER WATERSHED OPTION (Q = 4.4 m^3/s)

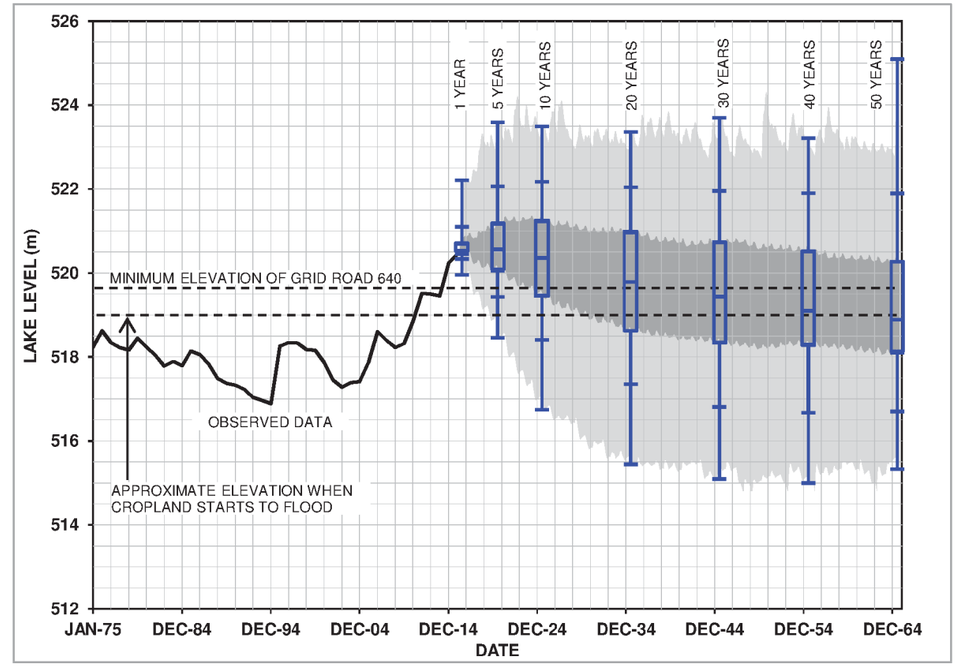
NOVEMBER 2016 | PLATE 22 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Removal of Water\Pump and Treat Water\Option 2\Flood Mitigation Options-Pump and Treat Opt2
11"x17" PLOT SCALE 1:1

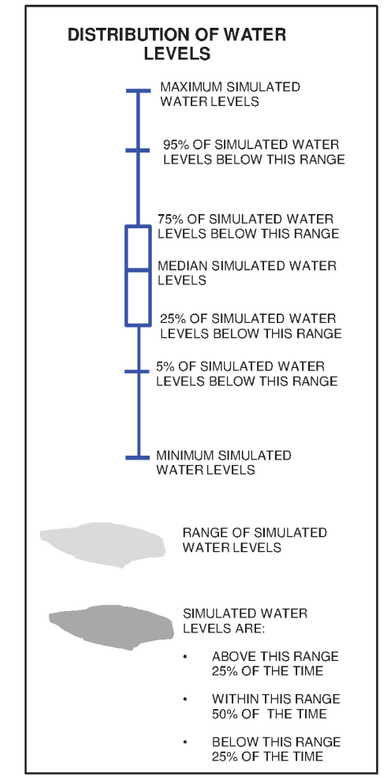
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

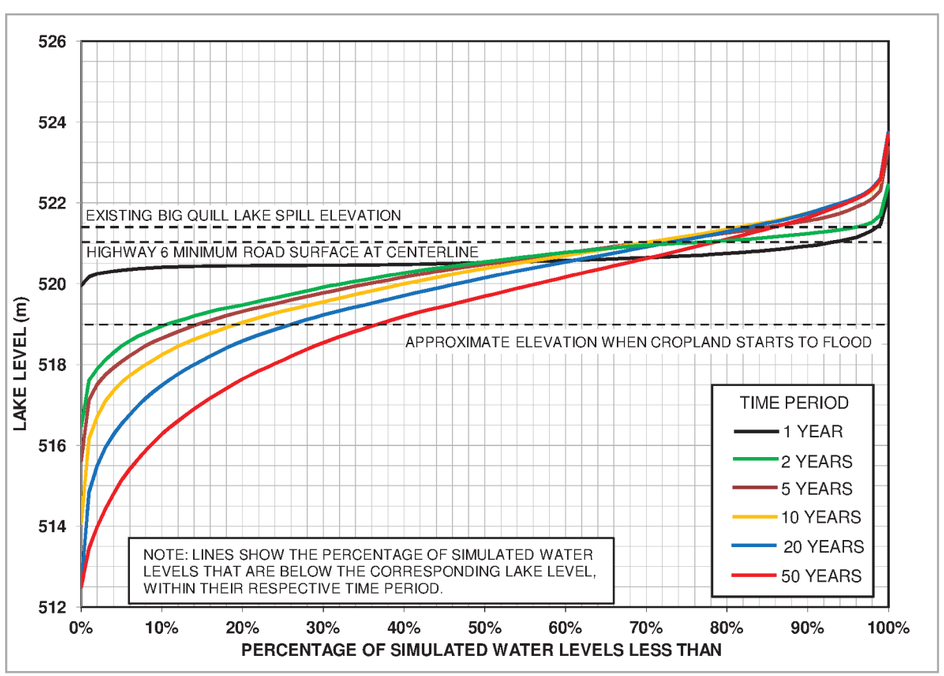


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

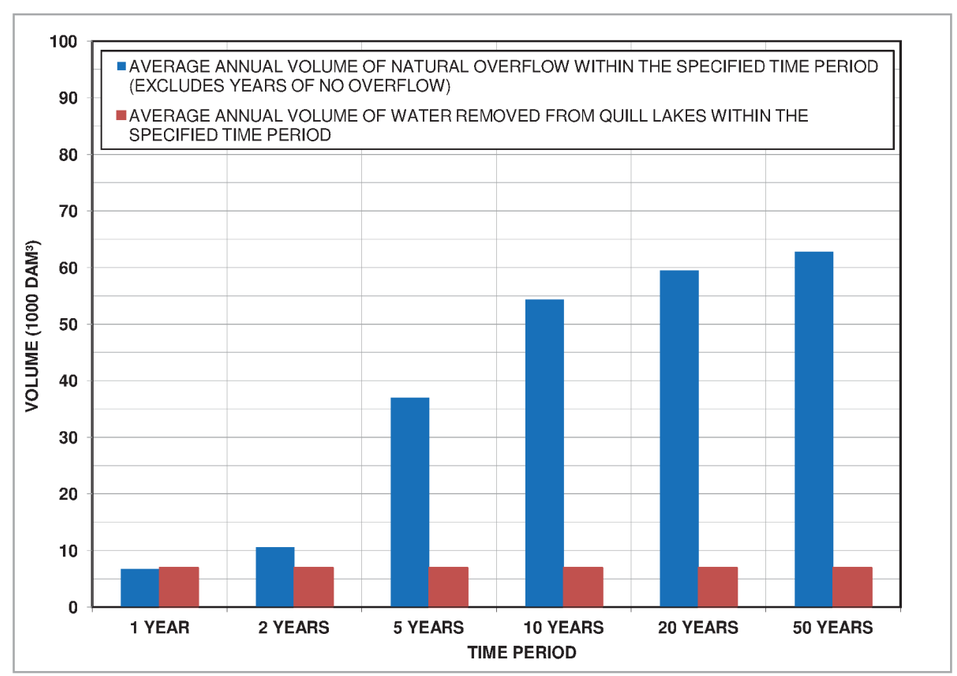


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
WITHDRAW WATER FOR BHP JANSEN LAKE OPTION (Q = 0.22 m^3/s)

NOVEMBER 2016 | PLATE 23 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Removal of Water\Withdraw Water for BHP\Flood Mitigation Options-Withdraw Water BHP V2..xlsm
11"x17" PLOT SCALE 1:1

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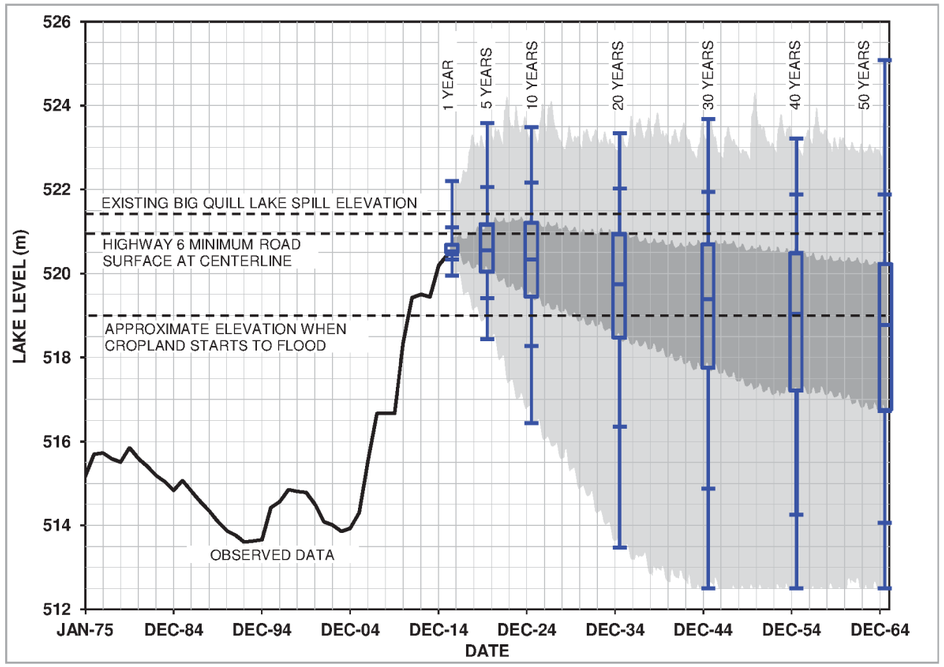
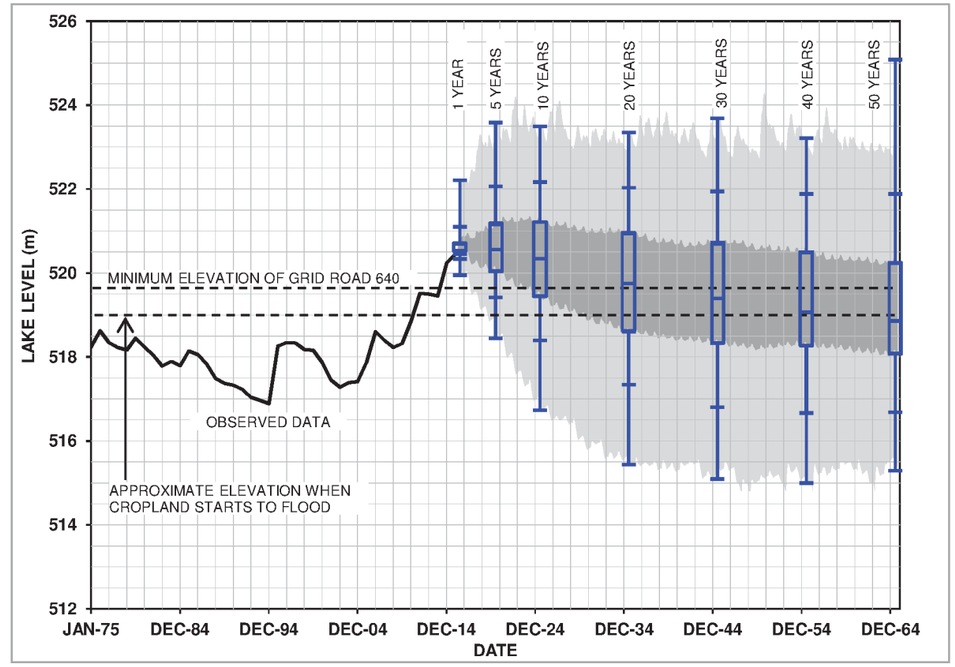
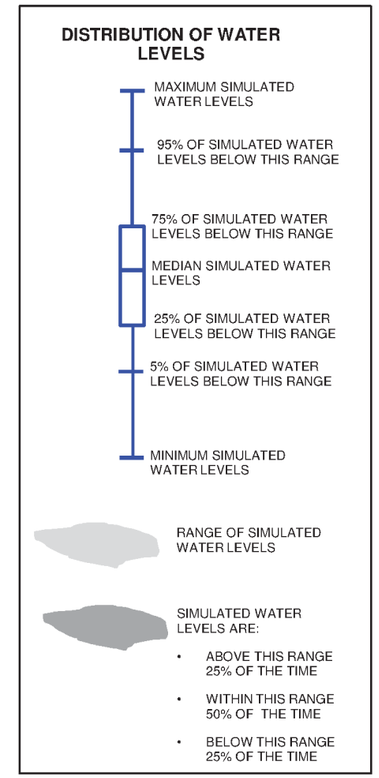
ALL RIGHTS RESERVED

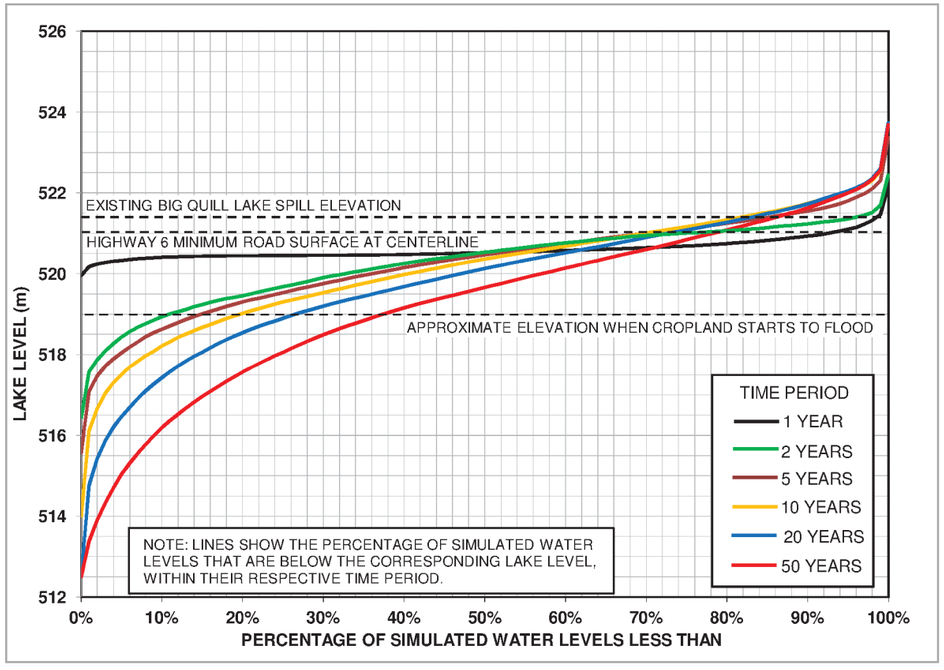


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

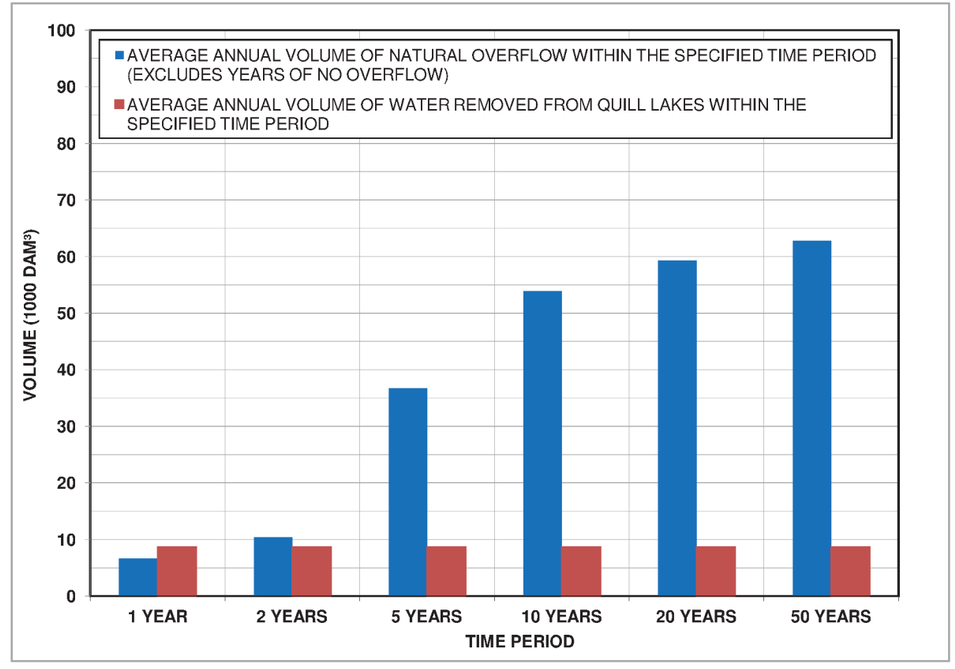


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
WITHDRAW WATER FOR KARNALYTE POTASH MINE OPTION (Q = 0.28 m^3/s)

NOVEMBER 2016 | PLATE 24 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Removal of Water\Flood Mitigation Options-Withdraw Water Karnalyte Potash Mine V2.xlsm
11"x17" PLOT SCALE 1:1

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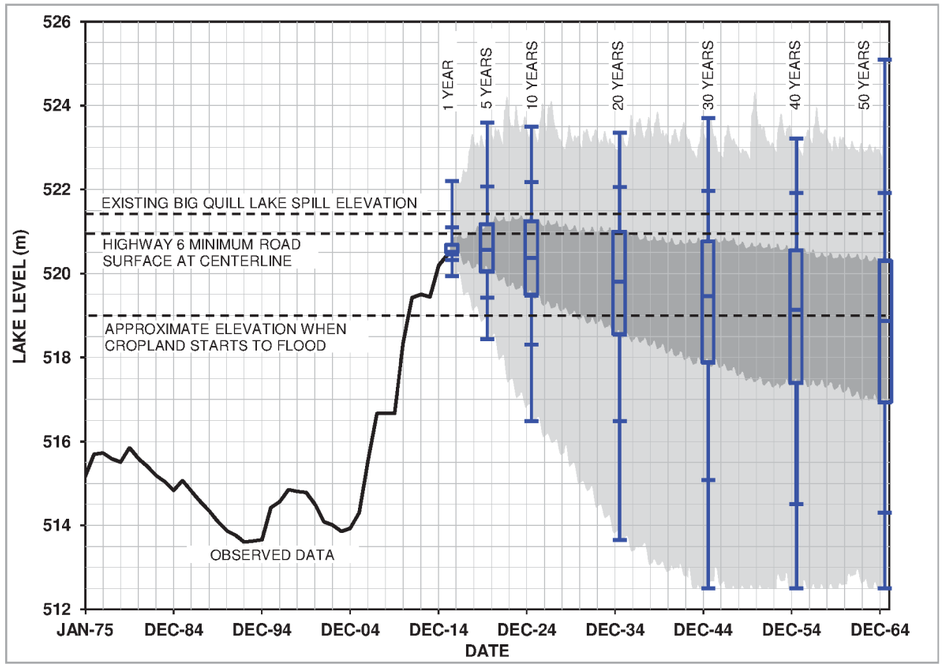
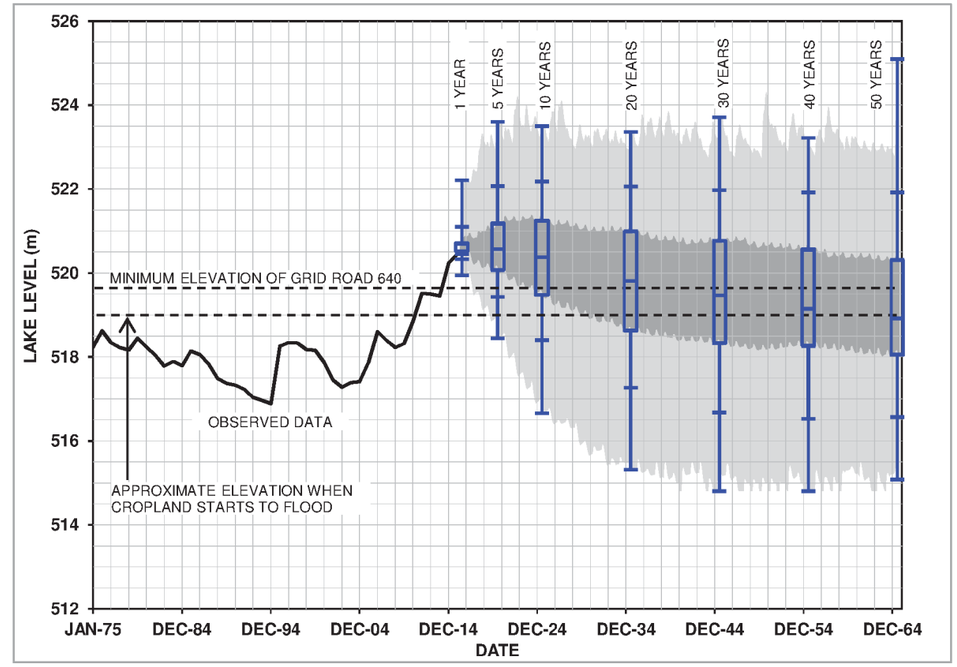
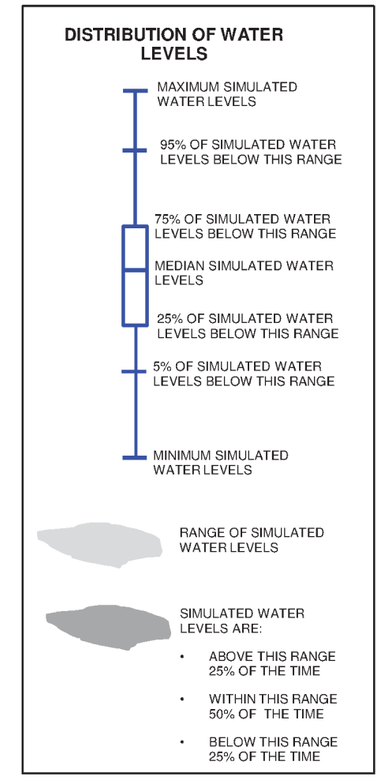
ALL RIGHTS RESERVED

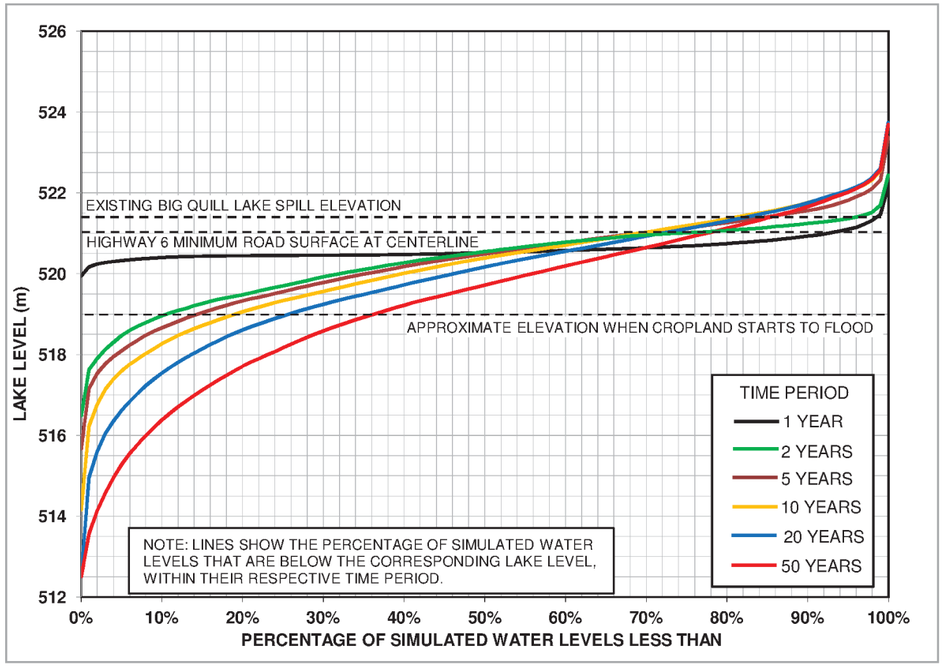


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

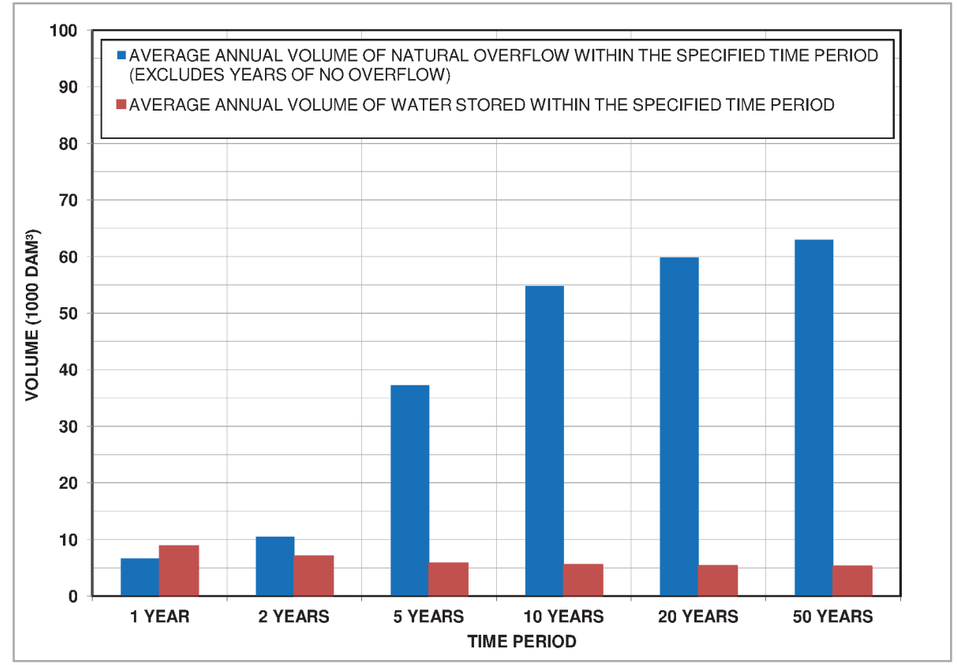


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

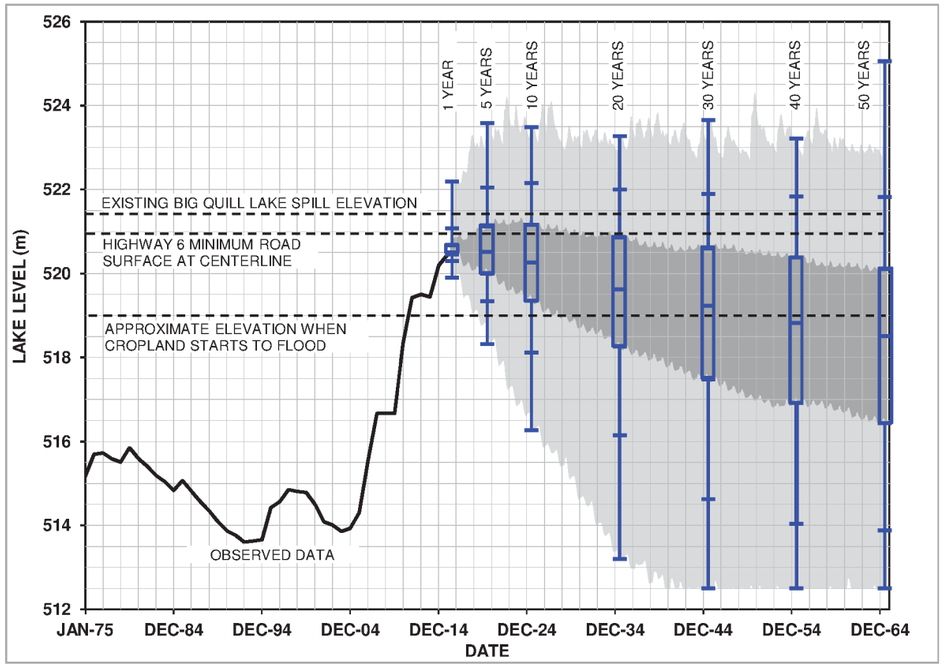
SUMMARY OF MODEL RESULTS

RESTORATION OF DRAINED AND PARTIALLY DRAINED WETLANDS OPTION (5000 DAM³)

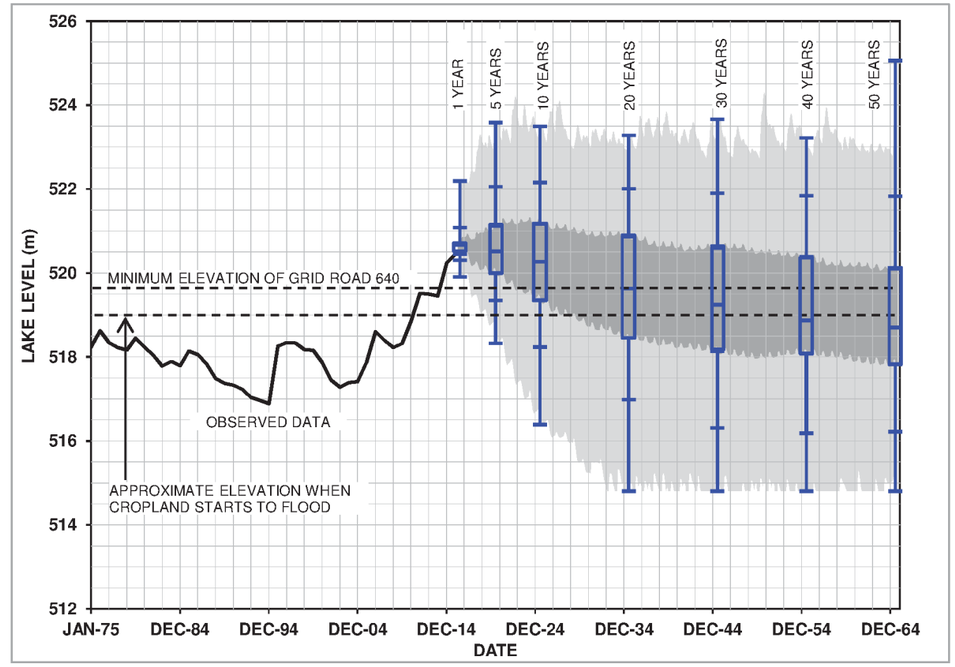
NOVEMBER 2016 | PLATE 25 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Inflow Reduction\Option 1\Flood Mitigation Options-Restoration 5000dam3 V2.xlsm
11"x17" PLOT SCALE 1:1

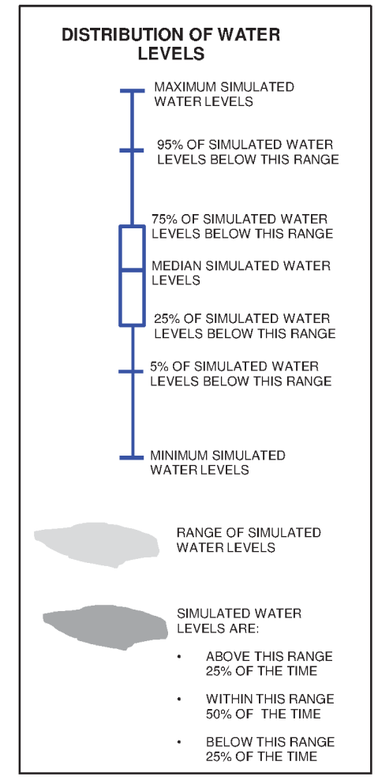
DATA PRODUCED BY KGS GROUP.
ALL RIGHTS RESERVED

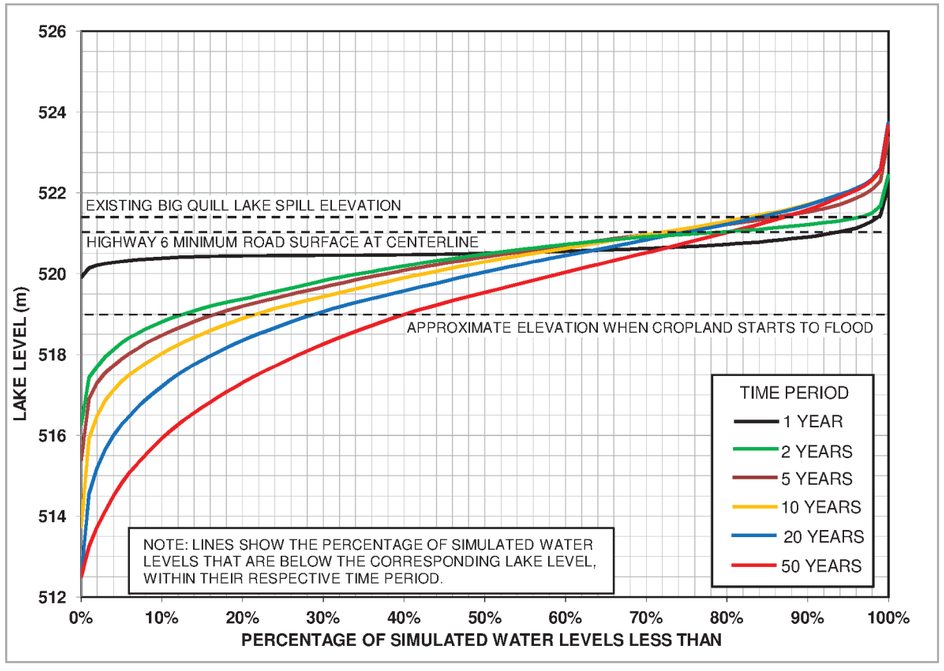


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

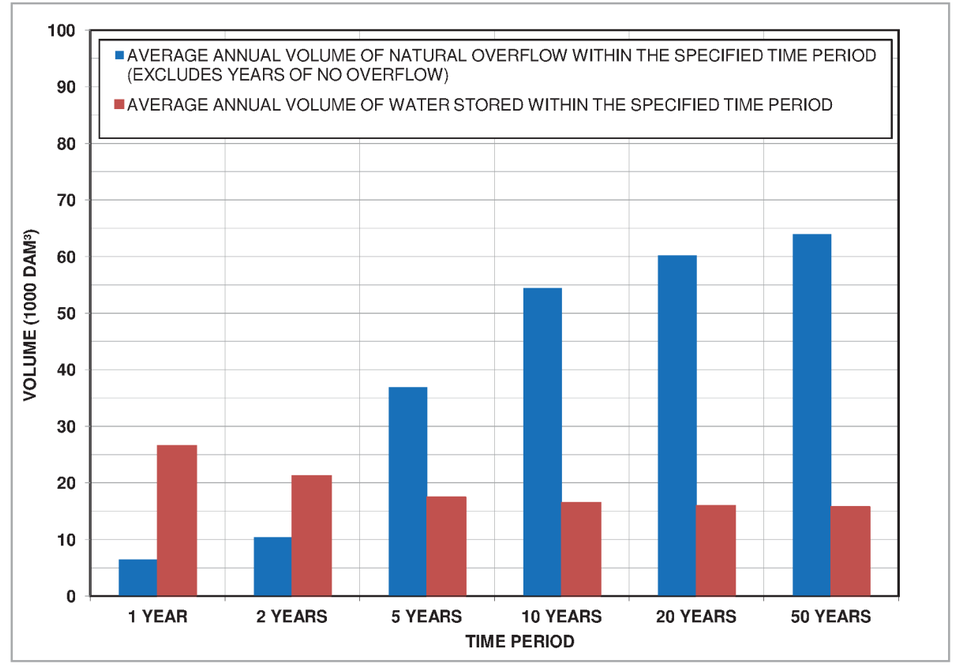


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
1) THE WATER LEVELS FOR THE QUILL LAKES WERE SIMULATED BY KGS GROUP USING A WATER BALANCE MODEL BASED ON RANDOMLY GENERATED RUNNOFF DATA AND EVAPORATION MINUS PRECIPITATION DATA FROM AN AUTOREGRESSIVE MODEL

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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
RESTORATION OF DRAINED AND PARTIALLY DRAINED WETLANDS OPTION (15000 DAM³)

NOVEMBER 2016 | PLATE 26 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options\Inflow Reduction\Option 1\Flood Mitigation Options-Restoration 5000dam3 V2.xlsm
11"x17" PLOT SCALE 1:1

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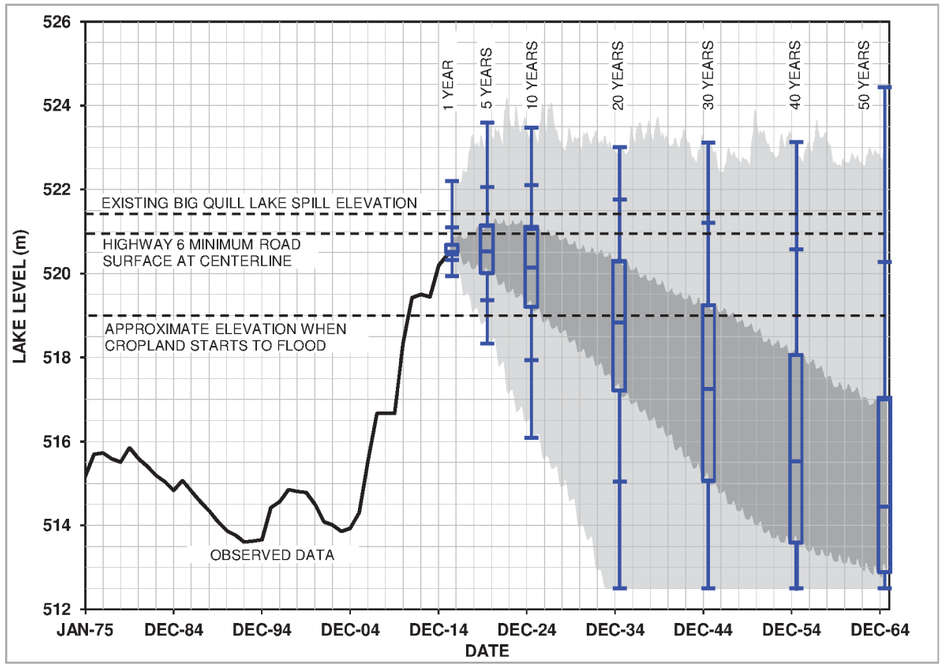
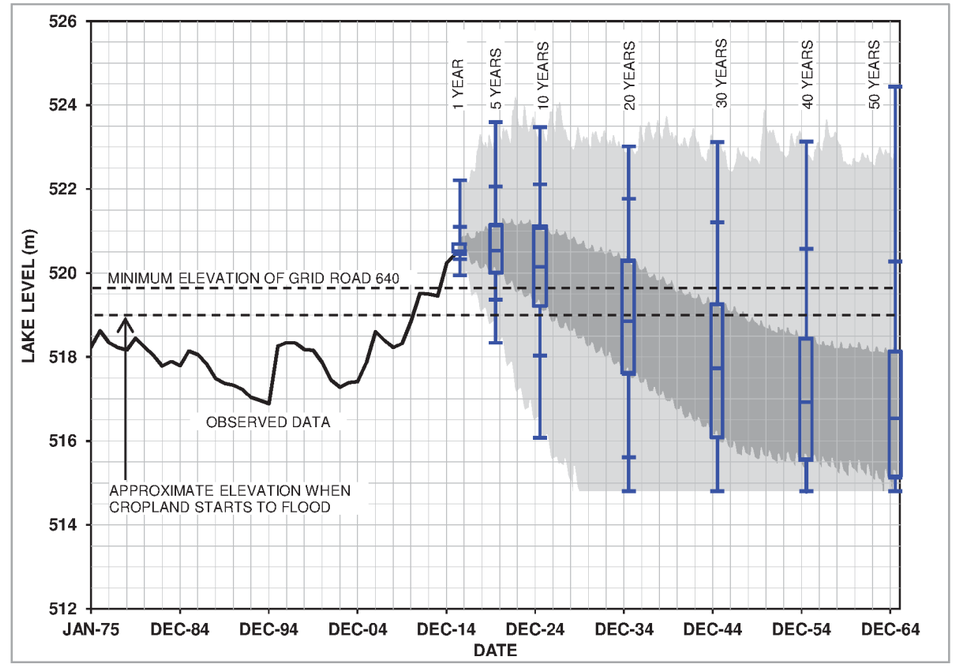
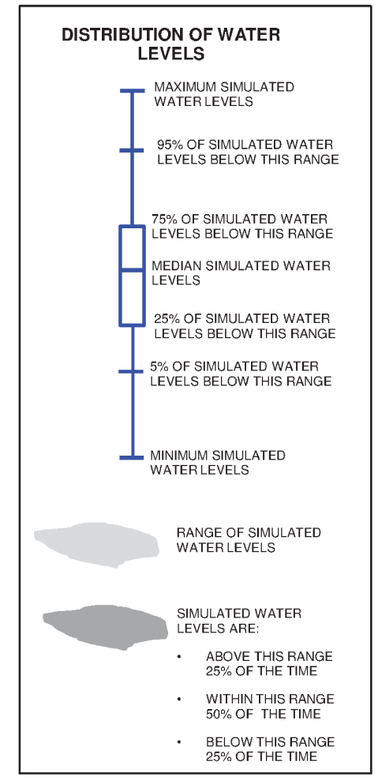
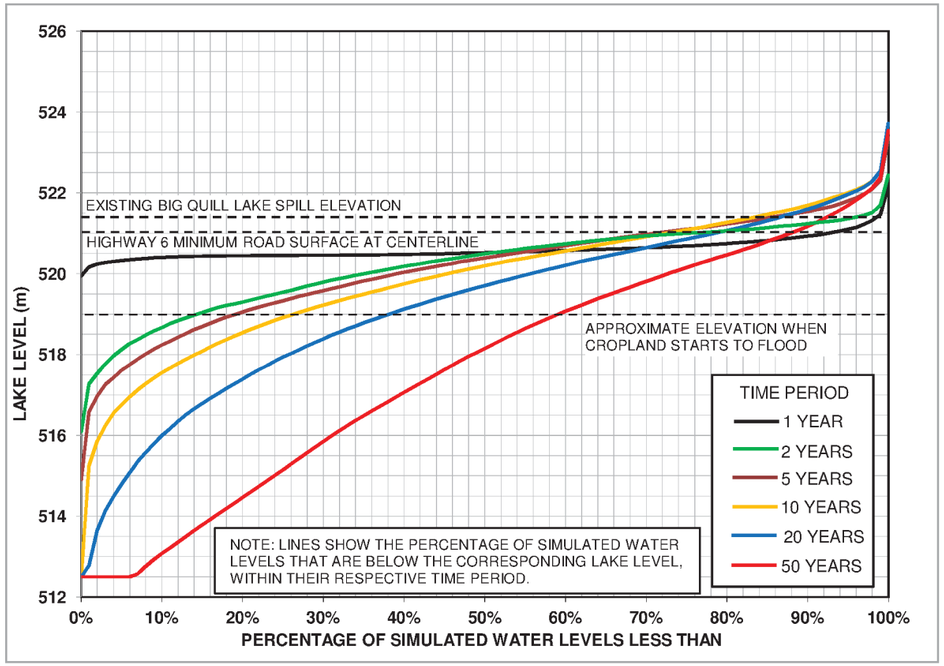


A) SIMULATED WATER LEVELS ON BIG QUILL LAKE

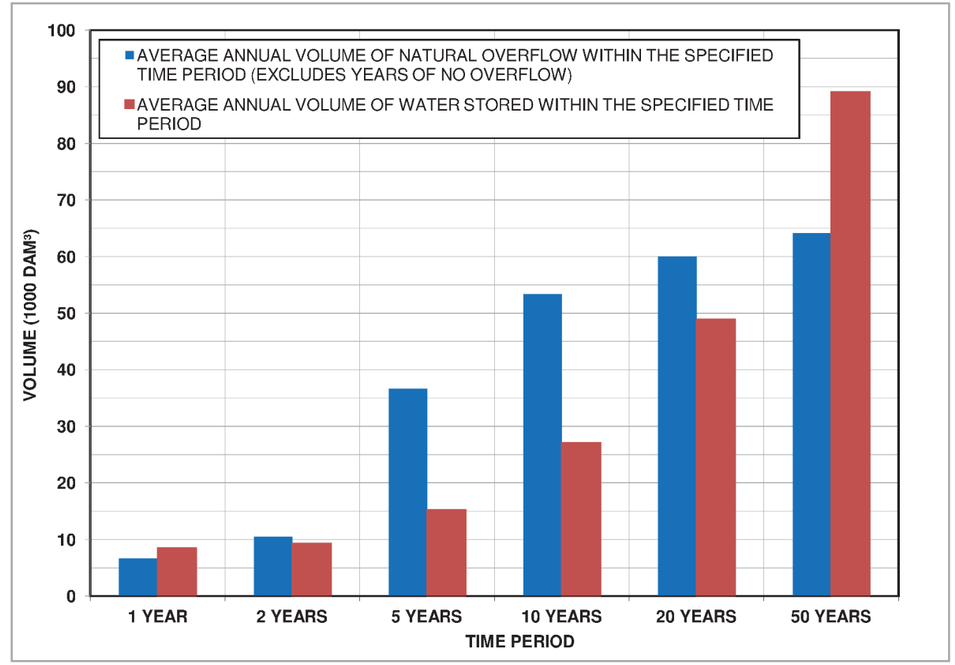


B) SIMULATED WATER LEVELS ON LITTLE QUILL LAKE





C) WATER LEVEL DURATION CURVES FOR BIG QUILL LAKE



D) SIMULATED AVERAGE ANNUAL VOLUMES

NOTES:
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QUILL LAKES FLOOD MITIGATION STUDY

SUMMARY OF MODEL RESULTS
CLOSURE OF DRAINAGE WORKS OPTION

NOVEMBER 2016 | PLATE 27 | REV: 0

FileName:P:\Projects\2015\15-0673-009\Design\Hydr\Flood Mitigation Options-Wetland Closure Inventoried Option
11"x17" PLOT SCALE 1:1