

From: jamesmeaney@nalcenergy.com
To: [Manzer, Alison](#); [David Pyper](#); [Kapoor, Anoop](#); [Krupski, Joseph](#); [Nikolay Argirov](#); [James Loucks](#); [Reynold Hokenson](#)
Cc: pharrington@lowerchurchillproject.ca; jasonkean@lowerchurchillproject.ca
Subject: LCP Schedule Call with MWH - Presentation for Review
Date: Monday, November 25, 2013 1:44:00 PM
Attachments: [.png](#)
[LCP Critical Path Review with MWH - 25-Nov-2013.pdf](#)
Importance: High

Hi Folks

Please find attached a presentation that the Nalcor team will walk you through to facilitate an effective and informative Schedule discussion this afternoon.

Regards

Jim



James Meaney, CFA
General Manager Finance
Nalcor Energy - Lower Churchill
Project
t. 709 737-4860 c. 709 727-5283 f.
709 737-1901
e.
JamesMeaney@nalcenergy.com
w. nalcenergy.com
1.888.576.5454

You owe it to yourself, and your family, to make it home safely every day. What have you done today so that nobody gets hurt?

----- Forwarded by James Meaney/NLHydro on 11/25/2013 01:40 PM -----

From: Jason Kean/NLHydro
To: Paul Harrington/NLHydro@NLHydro
Cc: James Meaney/NLHydro@NLHydro, Jonathan Stewart/NLHydro@NLHYDRO
Date: 11/25/2013 01:38 PM
Subject: Re: pls send the deck to Jim Meaney when ready

Paul,

Attached is referenced slide deck.

JK



LCP Critical Path Review with MWH - 25-Nov-2013.pdf

Jason R. Kean, P. Eng., MBA, PMP

Deputy General Project Manager

PROJECT DELIVERY TEAM

Lower Churchill Project

t. 709 737-1321 c. 709 727-9129 f. 709 754-0787

e. JasonKean@lowerchurchillproject.ca

w. musktratfalls.nalcorenergy.com

You owe it to yourself, and your family, to make it home safely every day. What have you done today so that nobody gets hurt?

LCP Critical Path Overview

Presented to MWH

25-Nov-2013

Boundless Energy



Take a
MOMENT
for Safety

Purpose

- Provide MWH with assurance that the critical path for the LCP is both understood and reasonable.

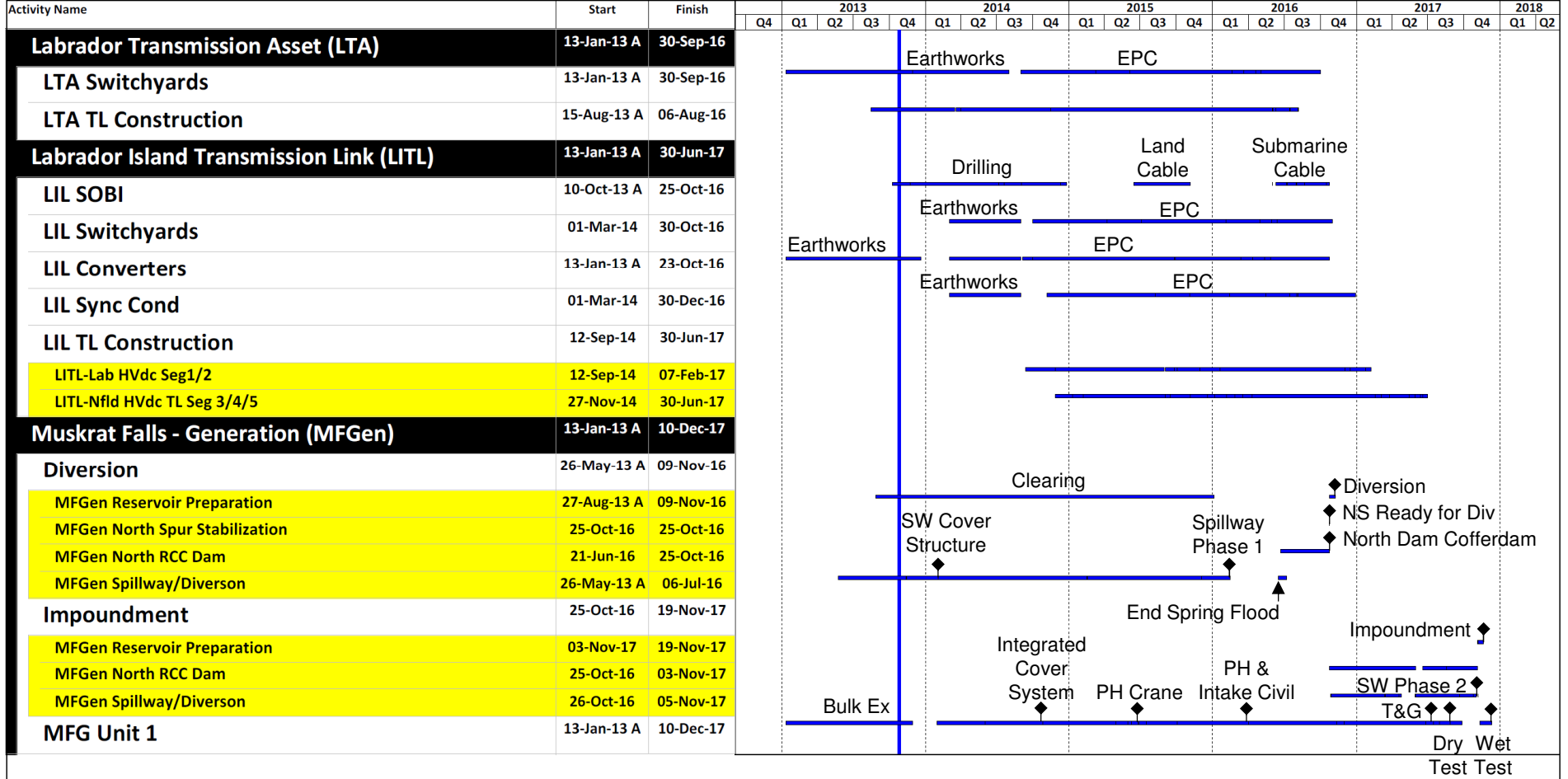
Key Messages

- Critical Path for Project runs through Muskrat Falls and remains virtually unchanged since pre-DG3.
- As previously discussed in the Cost Update, significant investments have been made under CH0007 in order to reduce risk exposure for critical activities.
- LIL and LTA are not on the Critical Path
- There considerable overall float in the schedule for both LIL and LTA
- The overall LCP schedule is very achievable and realistic

Integrated Project Schedule

Updated: 26-Oct-13

LCP Delivery Team Project Control



◆ Current Key Dates
 — Current Construction

Dry Test
 Wet Test

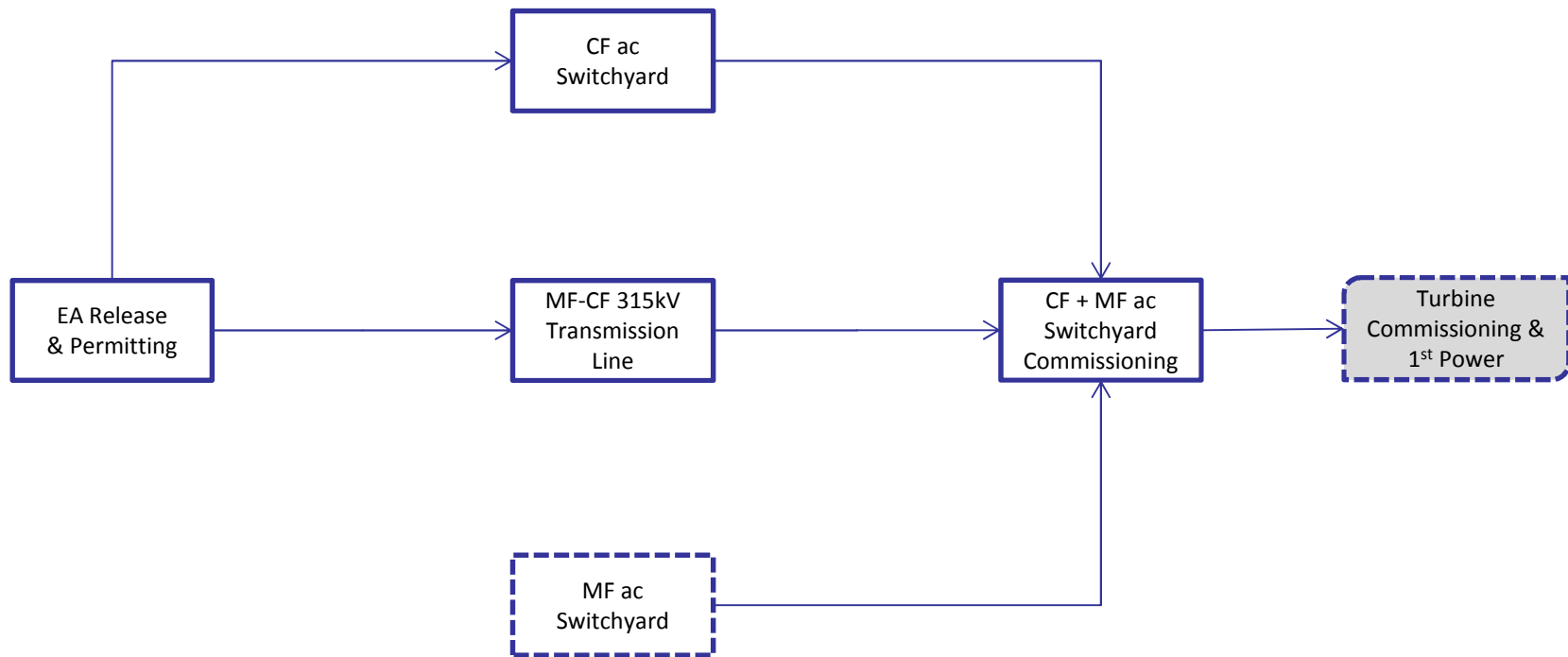


LTA Overall Schedule

LTA – Fundamental Schedule Logic

- LTA is comprised of work is largely independent scopes of work:
 - New 315kV CF Switchyard
 - Extension of existing CF Switchyard
 - ~1km of 735kV intertie between new and existing CF switchyards
 - MF Switchyard
 - 247km of dual 315kV transmission lines

LTA – Fundamental Construction Logic



LTA – Current Status

- All TL materials have been ordered and are being delivered to our operational Marshalling Yard outside HVGB
- The 315kV HVac Transmission Line construction is the longest duration activity with a forecasted total duration of ~30 months
 - Right of Way clearing commenced in August
 - TL construction contractor (CT0319) to mobilize in January – contract schedule is 700 days
- Earthworks complete at MF Switchyard
- Grubbing underway at CF Switchyard. All scope to be completed by June 30.

LTA – Current Status

- Switchyards EPC contract bids received – 22-Nov. Award forecasted by early Q2.
- The EPC contract duration is an expected 32 months.
- 735kV intertie between new and existing CF switchyards to be completed by CT0319 contractor at end of 315kV line works.
- LTA is therefore planned to be complete late 2016 to early 2017 – well ahead of First Power at MF (Dec 2017).
 - LTA Float is significant

LIL Schedule

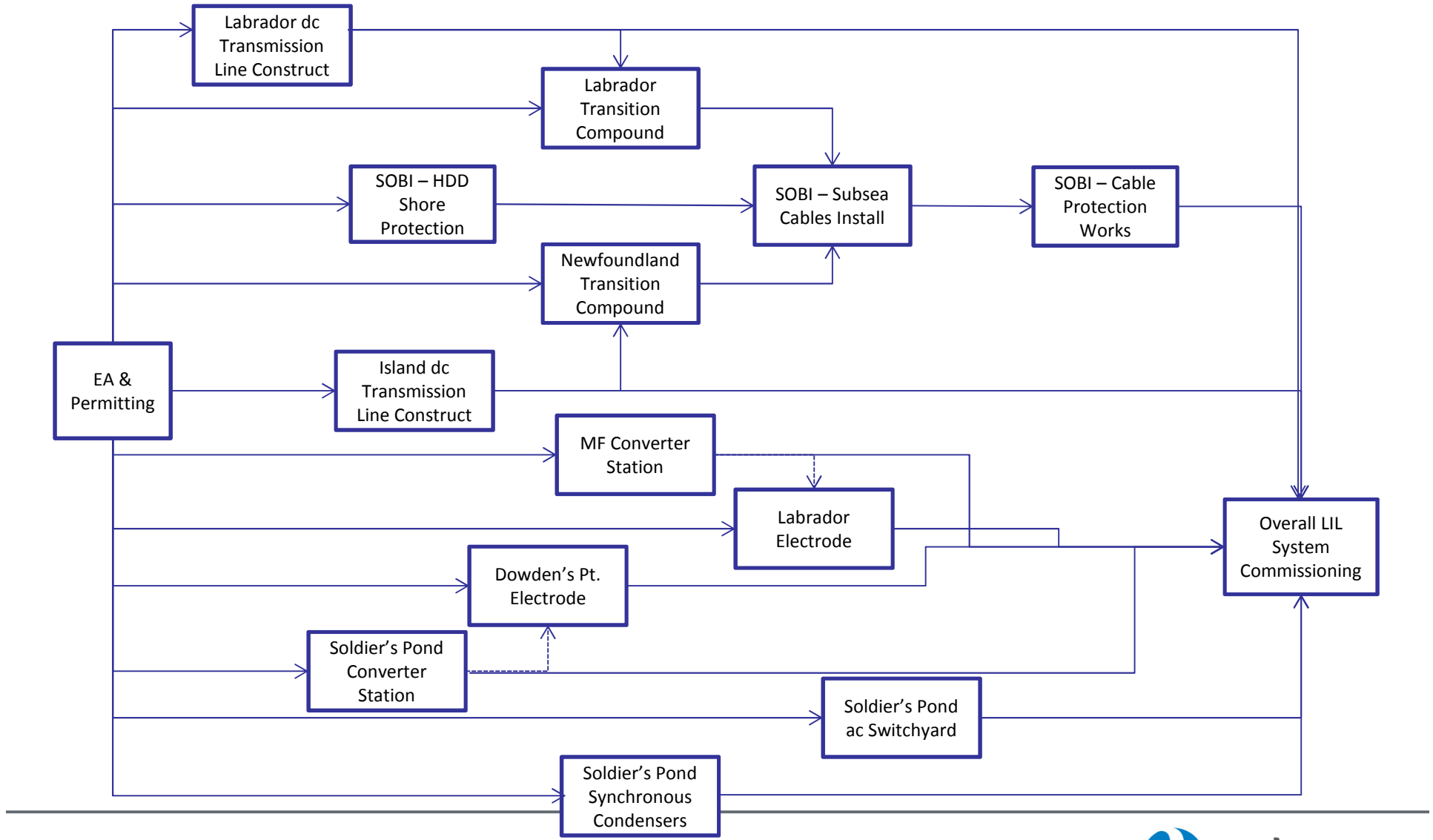
LIL – Fundamental Construction Logic

- LIL Construction sub-projects are largely independent, parallel work with key interface points
 - Transition compounds join together the overhead transmission lines and the SOBI cables
 - Converter stations connect to electrodes
 - Converter stations connect to ac switchyards (the MF switchyard is considered part of the MF project)
 - Converter stations connect to DC TL
 - Synchronous Condensers standalone with interconnect to switchyard

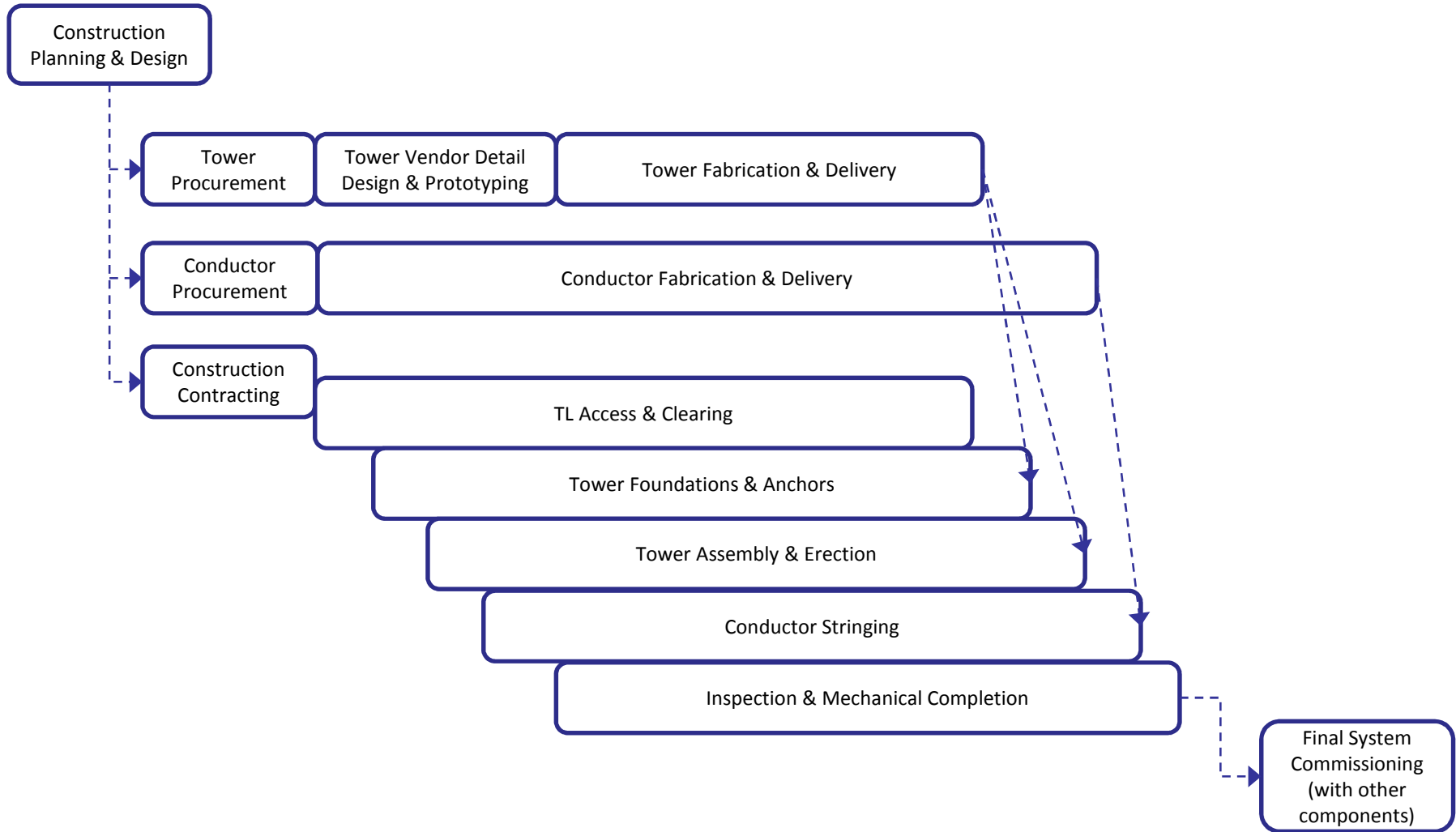
LIL – Fundamental Construction Logic

- Transmission Line construction takes place in overlapping “stages”
 - Right of way clearing and access
 - Installation of foundations and anchors
 - Assembly & erection of towers
 - Stringing of conductor
 - Inspection and Mechanical Completion
- TL construction has been planned to be done year round
- Each major section of TL has opportunity for multiple work fronts to be advanced simultaneously

LIL – Fundamental Construction Logic



LIL – HVdc TL – General Logic



LIL Current Status

- All TL materials have or will be ordered by end of 2013.
- Proposals for the Converter & Transition Compound EPC contract for MF & Soldiers Pond have been received
 - A LNTP is expected late 2013 with EPC contract execution late Q1 2014
- The EPC contract duration is an expected 32 months from contract LNTP
 - From start of field work, until ready for commissioning is 22 months
 - Start of field works is April 2015

LIL Current Status

- The SOBI cable is ordered, with type testing almost complete, and is due for installation in the summer of 2016
- The Horizontal Directional Drilling contract & Drilling Services contracts are awarded and drilling has started and will be complete by early 2015
- RFP responses are due for the Synchronous Condensers in December with forecasted for late Q2-2014
- LNTP for Earth Works at Soldier's Pond in-place
 - Work to commence Spring and conclude Fall 2014, several months before Converter or Synchronous Condenser EPC mob to site

LIL Current Status

- The LIL Transmission Line construction duration is expected 36 months, with final ROW clean-up occurring thereafter.
 - LIL Transmission Line contracts are due to be executed Q2 2014
 - Current evaluating execution synergies for Labrador segments with AC TL scope
 - Many work fronts available
 - No foreseen materials issues
- Consequently, LIL is forecasted to be complete in mid 2017 - six months ahead of First Power at MF (Dec 2017)
 - Float between end of construction LIL & LTA and First Power at MF is in the range of six to nine months

Muskrat Falls Schedule

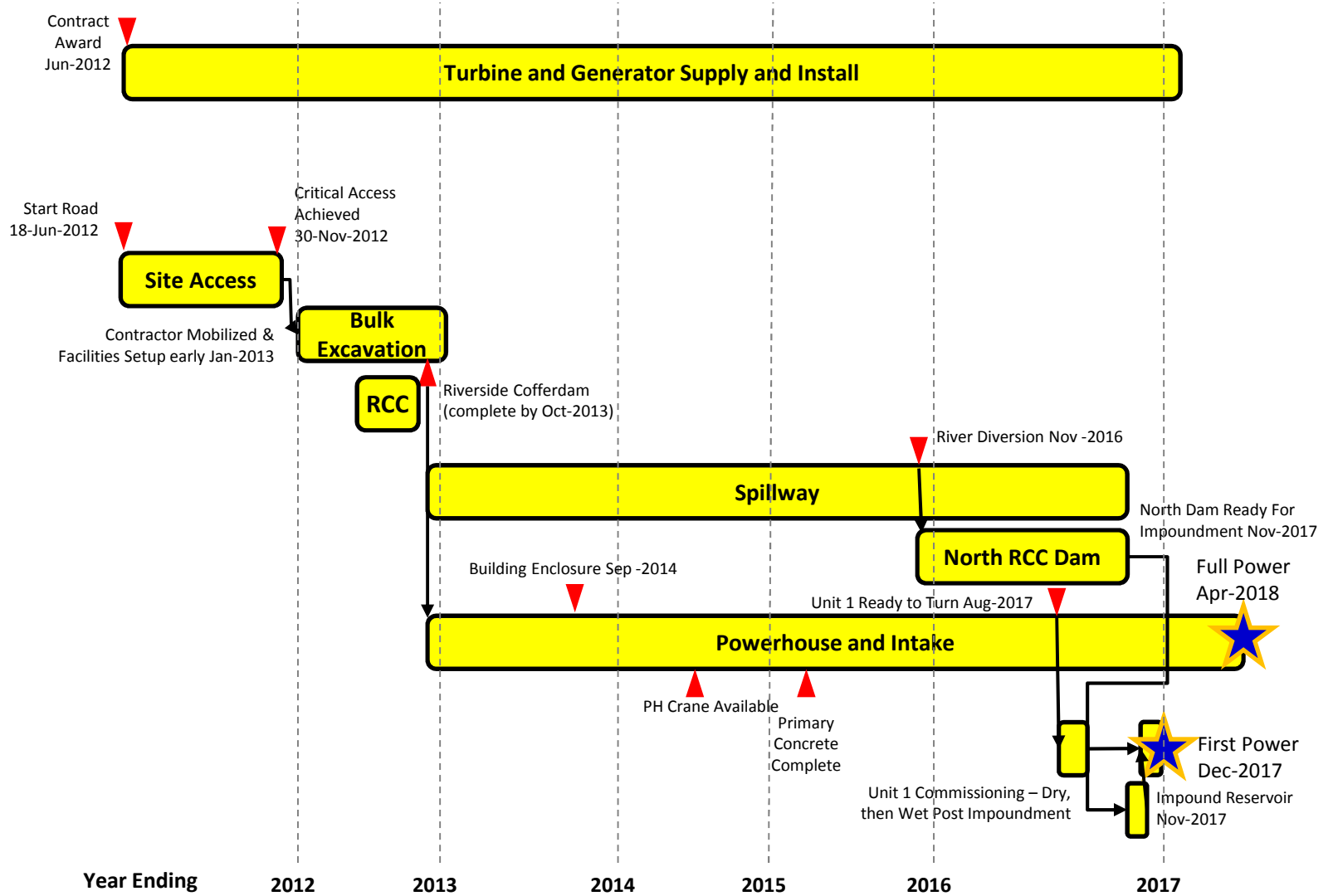
MF Construction Schedule Logic

- Completion of Early Works, including Access Road to enable CH0006 to start work was completed on schedule
- Substantial Completion of CH0006 by Nov 2013
 - RCC Dam completed 31-October
 - Spillway excavation complete
- Mobilization of Main Civil Contractor (CH0007) and commencement of spillway followed by Powerhouse
 - All supporting infrastructure will be in-place to support CH0007 mobilization

MF Construction Schedule Logic

- Turbine & Generator manufacturing and arrival of embedded parts
 - Manufacturing is well underway by Andritz
- Hydro-Mechanical Equipment manufacturing and arrival of embedded parts
 - Contract will be awarded following Financial Close and work has started under a LNTP to maintain the delivery of embedded parts

MF Simplified Critical Path



Activity Name	z IE Nov 23 2013	Start	Finish	2012		2013				2014				2015				2016				2017				2018	
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Muskrat Falls - Generation (MGen)																											
Diversion																											
MFGen Reservoir Preparation																											
MFG-Reservoir North:Clearing	Diversion	27-Aug-13 A	09-Nov-16	MFG-Reservoir North:Clearing																							
MFG Reservoir - Diversion Head Pond	Diversion	25-Oct-16	09-Nov-16	MFG Reservoir - Diversion Head Pond																							
MFG Reservoir - Ready for Diversion Headpond	Diversion	25-Oct-16	25-Oct-16	MFG Reservoir - Ready for Diversion Headpond, MFG Reservoir - Ready for Diversion Headpond																							
MFGen North Spur Stabilization																											
KD=MFG North Spur - Ready for Diversion Headpond	Diversion	25-Oct-16	25-Oct-16	Ready for Diversion Headpond, KD=MFG North Spur - Ready for Diversion Headpond																							
MFGen North RCC Dam																											
MFG-North Dam: Upstream Cofferdam(5)	Diversion	21-Jun-16	25-Oct-16	MFG-North Dam: Upstream Cofferdam(5)																							
MFGen Spillway/Diverson																											
MFG-SpilDiv1: Excavation - Spillway (without plug)	Diversion	26-May-13 A	13-Nov-13	Spillway (without plug)																							
MFG-SpilDiv1 Civil:: Ph1 Foundation Preparation - Spillway	Diversion	14-Nov-13	04-Apr-14	Foundation Preparation - Spillway																							
MFG-SpilDiv1 Civil: Ph1 Structures - Spillway	Diversion	01-Feb-14	15-Feb-15	SpilDiv1 Civil: Ph1 Structures - Spillway																							
MFG-SpilDiv1 Install: Hydro-Mech Spillway (gates/Stoplogs)	Diversion	16-Feb-15	02-Dec-15	SpilDiv1 Install: Hydro-Mech Spillway (gates/Stoplogs)																							
MFG-SpilDiv1 Completions: Hydro-Mech Spillway (static - dynamic-gates/Stoplogs)	Diversion	03-Dec-15	14-Feb-16	SpilDiv1 Completions: Hydro-Mech Spillway (static - dynamic-gates/Stoplogs)																							
KD=MFG Spillway-Phase I Ready for Diversion	Diversion	15-Jun-16*	14-Feb-16	Phase I Ready for Diversion, KD=MFG Spillway -Phase I Ready for Diversion																							
KD=MFG Reservoir-End of Spring Flood (June 15 2016)	Diversion	15-Jun-16*	14-Feb-16	KD=MFG Reservoir-End of Spring Flood (June 15 2016), KD=MFG Reservoir-End of Spring Flood (June 15 2016)																							
MFG-SpilDiv1: Civil Works:Cofferdams 1/2/Riverside RCC(10) Rem	Diversion	15-Jun-16	06-Jul-16	MFG-SpilDiv1: Civil Works:Cofferdams 1/2/Riverside RCC(10) Removed																							
Impoundment																											
MFGen Reservoir Preparation																											
MFG Reservoir-Ready to Impound	Impoundment	03-Nov-17	19-Nov-17	MFG Reservoir-Ready to Impound, MFG Reservoir-Ready to Impound																							
MFG Reservoir -Impoundment	Impoundment	06-Nov-17	19-Nov-17	MFG Reservoir -Impoundment																							
MFGen North RCC Dam																											
MFG-North Dam Earth: Foundation Preparation	Impoundment	25-Oct-16	31-May-17	MFG-North Dam Earth: Foundation Preparation																							
MFG-North Dam: RCC	Impoundment	18-Jun-17	30-Sep-17	MFG-North Dam: RCC																							
MFG-North Dam: CVC	Impoundment	17-Aug-17	03-Nov-17	MFG-North Dam: CVC																							
MFGen Spillway/Diverson																											
MFG-SpilDiv2 Place Stoplogs and Dewater Bay 1	Impoundment	26-Oct-16	27-Oct-16	MFG-SpilDiv2 Place Stoplogs and Dewater Bay 1																							
MFG-SpilDiv2 Civil Works: Rollway 1	Impoundment	28-Oct-16	13-Mar-17	MFG-SpilDiv2 Civil Works: Rollway 1																							
MFG-SpilDiv2 Install: Stoplog/Gate Guides Gate 1	Impoundment	14-Mar-17	17-Apr-17	MFG-SpilDiv2 Install: Stoplog/Gate Guides Gate 1																							
MFG-SpilDiv2 Completions: Spillway Gates Bay 1 - Dry Test (Static)	Impoundment	18-Apr-17	25-Apr-17	MFG-SpilDiv2 Completions: Spillway Gates Bay 1 - Dry Test (Static)																							
MFG-SpilDiv2 Place Stoplogs and Dewater Bay 3	Impoundment	30-May-17	30-May-17	MFG-SpilDiv2 Place Stoplogs and Dewater Bay 3																							
MFG-SpilDiv2 Place Stoplogs and Dewater Bay 5	Impoundment	30-May-17	30-May-17	MFG-SpilDiv2 Place Stoplogs and Dewater Bay 5																							
MFG-SpilDiv2 Civil Works: Rollway 3	Impoundment	31-May-17	19-Sep-17	MFG-SpilDiv2 Civil Works: Rollway 3																							
MFG-SpilDiv2 Civil Works: Rollway 5	Impoundment	31-May-17	19-Sep-17	MFG-SpilDiv2 Civil Works: Rollway 5																							
MFG-SpilDiv2 Install: Guides Rollway 3 -Phase 2	Impoundment	20-Sep-17	24-Oct-17	MFG-SpilDiv2 Install: Guides Rollway 3 -Phase 2																							
MFG-SpilDiv2 Install: Guides Rollway 5 - Phase 2	Impoundment	20-Sep-17	24-Oct-17	MFG-SpilDiv2 Install: Guides Rollway 5 - Phase 2																							
MFG-SpilDiv2 Completions: Spillway Gates Bay 3 - Dry Test (static)	Impoundment	25-Oct-17	01-Nov-17	MFG-SpilDiv2 Completions: Spillway Gates Bay 3 - Dry Test (static)																							
MFG-SpilDiv2 Completions: Spillway gates Rollway 5 - Dry test (static)	Impoundment	25-Oct-17	01-Nov-17	MFG-SpilDiv2 Completions: Spillway gates Rollway 5 - Dry test (static)																							
MFG-SpilDiv2 Place Stoplogs and Dewater Bay 2	Impoundment	05-Nov-17	05-Nov-17	MFG-SpilDiv2 Place Stoplogs and Dewater Bay 2																							
MFG-SpilDiv2 Place Stoplogs and Dewater Bay 4	Impoundment	05-Nov-17	05-Nov-17	MFG-SpilDiv2 Place Stoplogs and Dewater Bay 4																							
MFG Unit 1																											
MFGen Power House & Intake																											
MFG-PH Excavation: Powerhouse (incl Cofferdam 3)	MFG Unit 1	13-Jan-13 A	30-Nov-13	incl Cofferdam 3)																							
MFG-PH Civil: Unit 1 Structure Ph 1 (bldg enclosed)	MFG Unit 1	30-Jan-14*	30-Sep-15	Unit 1 Structure Ph 1 (bldg enclosed)																							
MFG-PH Civil: Unit 1 Intake Structure	MFG Unit 1	25-Oct-14	31-Mar-16	MFG-PH Civil: Unit 1 Intake Structure																							
MFG-PH Install: Hydro-mech Draft tube (incl Dry Test) Unit 1	MFG Unit 1	01-Oct-15	16-May-16	MFG-PH Install: Hydro-mech Draft tube (incl Dry Test) Unit 1																							
MFG-PH Install: T/G Embedded Parts & Structure Ph 2 Unit 1	MFG Unit 1	01-Oct-15	30-Nov-16	MFG-PH Install: T/G Embedded Parts & Structure Ph 2 Unit 1																							
MFG-PH Install/Comm: T/G Ancillary Systems - Unit 1	MFG Unit 1	01-Oct-15	29-Jul-17	MFG-PH Install/Comm: T/G Ancillary Systems - Unit 1																							
MFG-PH Install/Comm: Bldg Utility Systems - Unit 1	MFG Unit 1	01-Oct-15	30-Nov-16	MFG-PH Install/Comm: Bldg Utility Systems - Unit 1																							
MFG-PH Install: Hydro-mech Intake (incl Dry Test) Unit 1	MFG Unit 1	01-Apr-16	10-Nov-16	MFG-PH Install: Hydro-mech Intake (incl Dry Test) Unit 1																							
MFG-PH Install: Pit free - Unit 1	MFG Unit 1	30-Nov-16	30-Nov-16	MFG-PH Install: Pit free - Unit 1, MFG-PH Install: Pit free - Unit 1																							
MFG-PH Install: Turbine/generator - Unit 1 Pit Free to Dry Test	MFG Unit 1	30-Nov-16	29-Jul-17	MFG-PH Install: Turbine/generator - Unit 1 Pit Free to Dry Test																							
MFG-PH: Install Telecom - Unit 1	MFG Unit 1	13-Mar-17	11-Jun-17	MFG-PH: Install Telecom - Unit 1																							
MFG-PH Telecom: Static Comm-Unit 1	MFG Unit 1	25-Jun-17	15-Jul-17	MFG-PH Telecom: Static Comm-Unit 1																							
MFG-PH Completions: Static Comm. (Dry Tests) - Unit 1	MFG Unit 1	29-Jul-17	28-Aug-17	MFG-PH Completions: Static Comm. (Dry Tests) - Unit 1																							
MFG-PH Completions: Ready to Turn - Unit 1	MFG Unit 1	28-Aug-17	28-Aug-17	MFG-PH Completions: Ready to Turn - Unit 1, MFG-PH Completions: Ready to Turn - Unit 1																							
MFG-PH Completions: Dynamic Comm. -Wet Tests (Mech) T/G- Unit 1	MFG Unit 1	28-Aug-17	27-Sep-17	MFG-PH Completions: Dynamic Comm. -Wet Tests (Mech) T/G- Unit 1																							
MFG-PH Completions: Dynamic Comm.-Wet Tests (Load) T/G- Unit 1	MFG Unit 1	11-Nov-17	10-Dec-17	MFG-PH Completions: Dynamic Comm.-Wet Tests (Load) T/G- Unit 1																							
MFG-PH Completions: WATER Available- Unit 1	MFG Unit 1	11-Nov-17	10-Dec-17	MFG-PH Completions: WATER Available- Unit 1, MFG-PH Completions: WATER Available- Unit 1																							
KD=MFGen Unit 1 Ready for Operations (RFO)	MFG Unit 1	10-Dec-17	10-Dec-17	KD=MFGen Unit 1 Ready for Operations (RFO), KD=MFGen Unit 1 Ready for Operations (RFO)																							

MF Critical Path – Spillway

- Spillway Phase 1 construction will be protected by a simple temporary structure by Jan/Feb 2014
- Spillway concrete will be complete Q1/Q2 2015
- Spillway work – Phase 1 is from Jan 2014 to Feb 2016
- This includes foundations preparation, civil structures & hydro mechanical (gates & stoplogs)
- River diversion is when the Spillway work is ready for diversion and the North Dam cofferdams are complete (Oct 2016)
- Spillway Phase 2 work begins post diversion (Oct 2016) with substantial completion in Nov 2017

MF Critical Path – Powerhouse

- Following LNTP, the design, fabrication & installation of the Integrated Cover System (ICS) is started and will be complete Sep/Oct 2014
- This ICS will permit year round work in a controlled environment and will mitigate weather risk
- Powerhouse & Intakes civil works are due to be complete Dec 2016
- Powerhouse cranes will be installed/tested when the building is enclosed in May/June/July 2015
- Powerhouse T&G installation is planned to start Oct 2015 and be ready to turn Unit 1 Aug 2017
- Commissioning & start up of Unit 1 is complete 10-Dec-2017, followed by Unit 2, 3 & 4 by April 2018

MF Critical Path – River Diversion

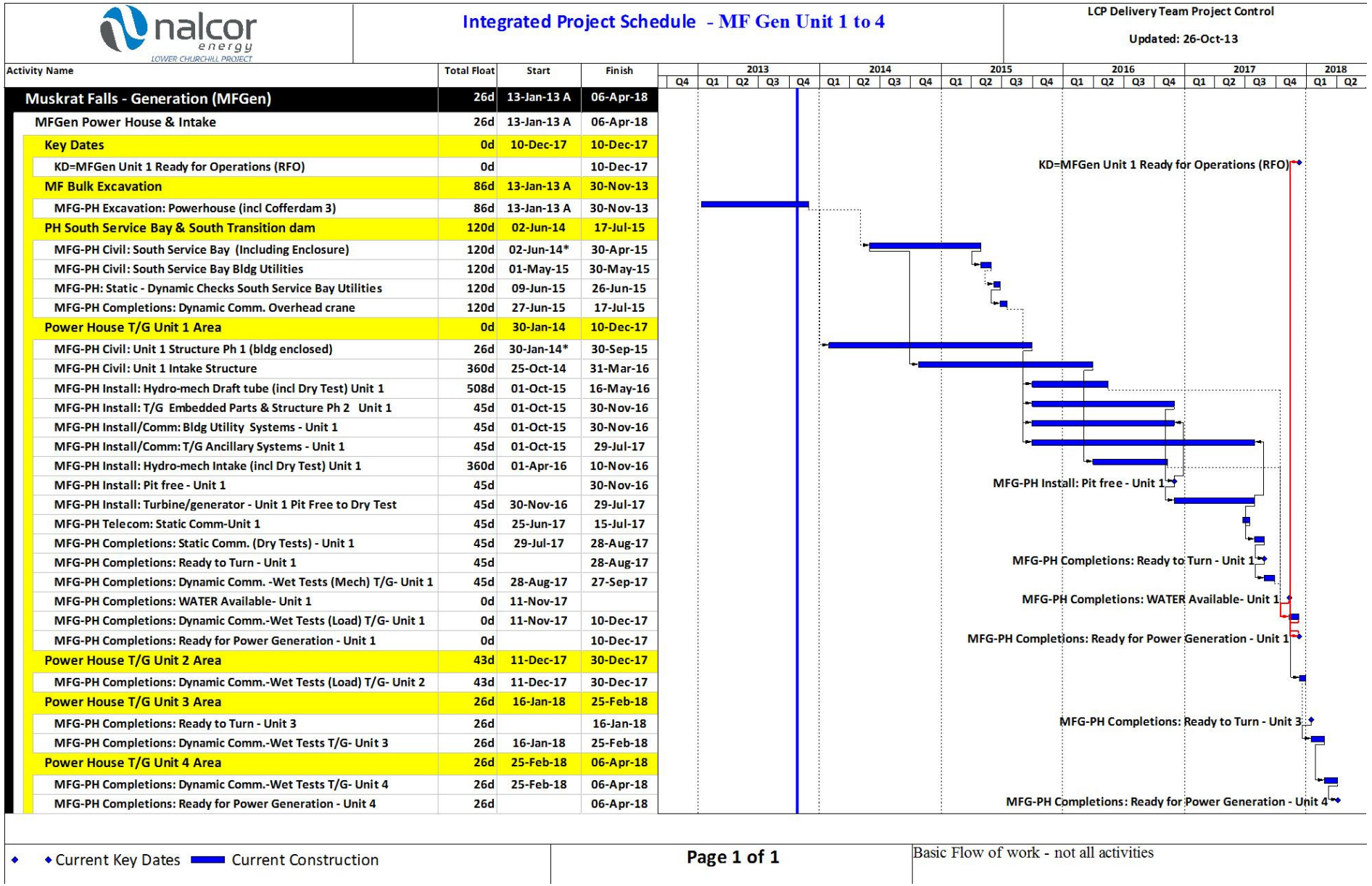
- Reservoir clearing prior to diversion commenced Jun 2013, with a completion forecasted before mid-2016
- Under negotiation with CH0007 Main Civil Contractor for North Spur Stabilization works and North and South Dams
 - The increased work scope will minimize the interfaces between Contractors
 - N. Spurs works to commence Spring 2014
- River is diverted through Spillway 09-Nov-2016
- North RCC Dam construction in 2017
- Impoundment preparation is planned to start 06-Nov-2017, with impoundment complete on 19-Nov-2017

MF Schedule – Overall

- Overall duration from start of excavation (January 2013) to completion of construction (July 2017) is 55 months
- Duration is considered reasonable
- Early schedule critical dates have been achieved
- Significant investment in risk reduction measures with CH0007 in order to minimize likelihood of delay
- Dry & wet tests and startup is from July 2017 until April 2018, a period of 8 months

Questions?

Supplemental Material



◆ Current Key Dates ■ Current Construction

Basic Flow of work - not all activities

Sharing our ideas in an open and supportive manner to achieve excellence.

Teamwork

Open Communication

Fostering an environment where information moves freely in a timely manner.

Honesty and Trust

Being sincere in everything we say and do.

Relentless commitment to protecting ourselves, our colleagues, and our community.

Safety

Respect and Dignity

Appreciating the individuality of others by our words and actions.

Leadership

Empowering individuals to help, guide and inspire others.

Holding ourselves responsible for our actions and performance.

Accountability