

Railbelt Large Hydroelectric

House Energy Committee – Karahnjukar Hydroelectric Project;
Federal Energy Regulatory Commission Licensing

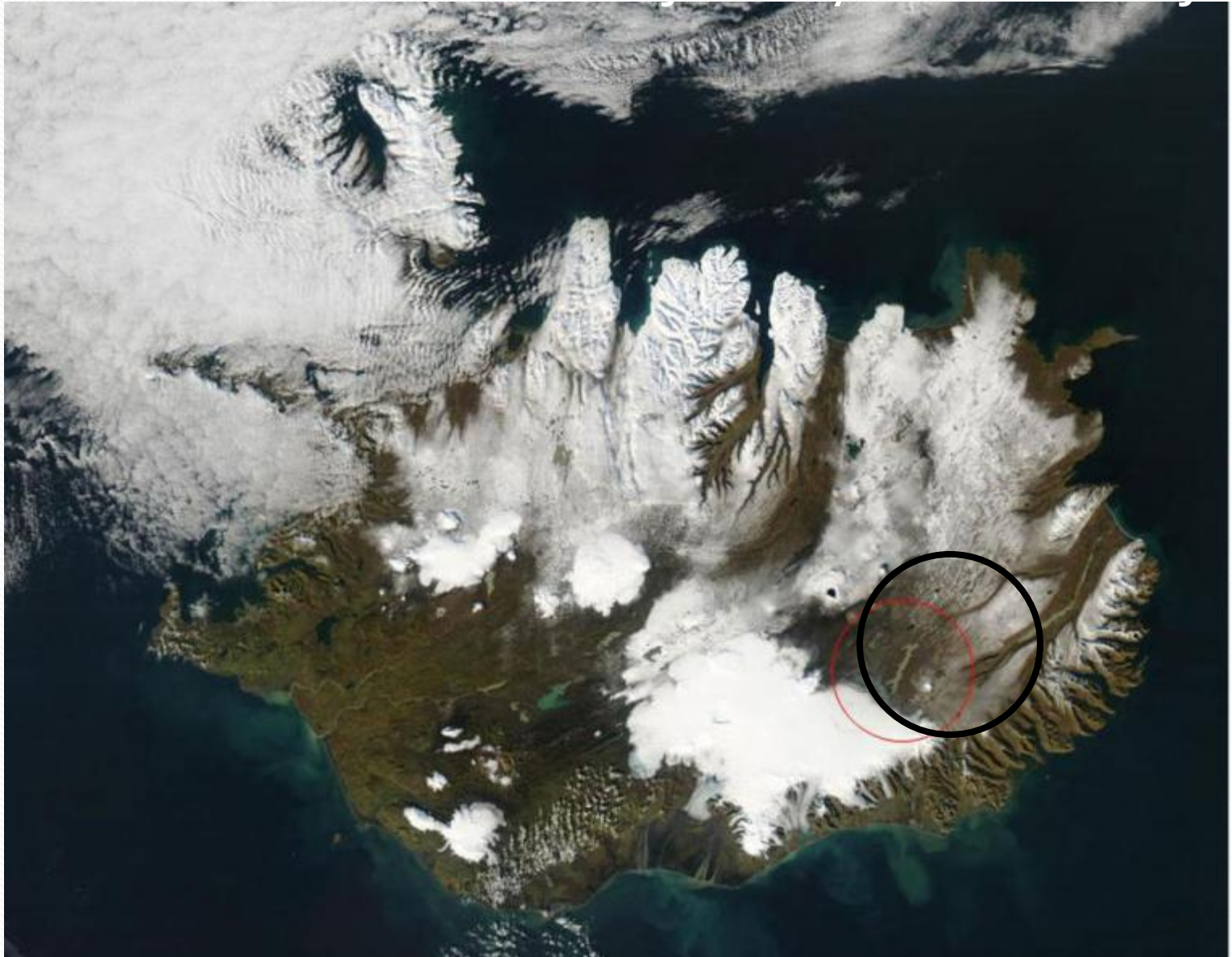
Prepared by Alaska Energy Authority 2/17/2011



Kárahnjúkar Hydro Project



Project Location - Iceland



The Source – The Glacier

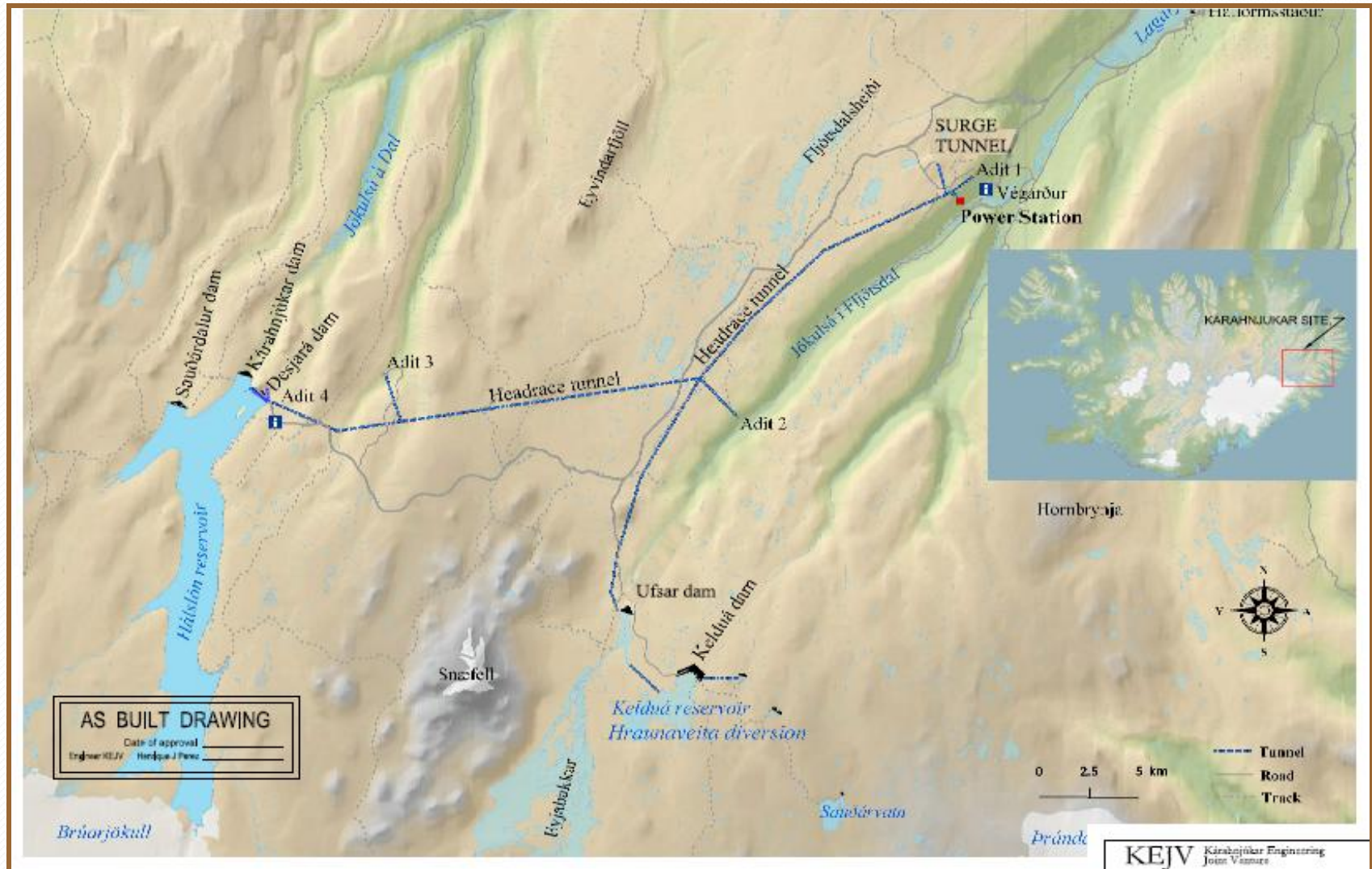


Háslón Reservoir, 2007

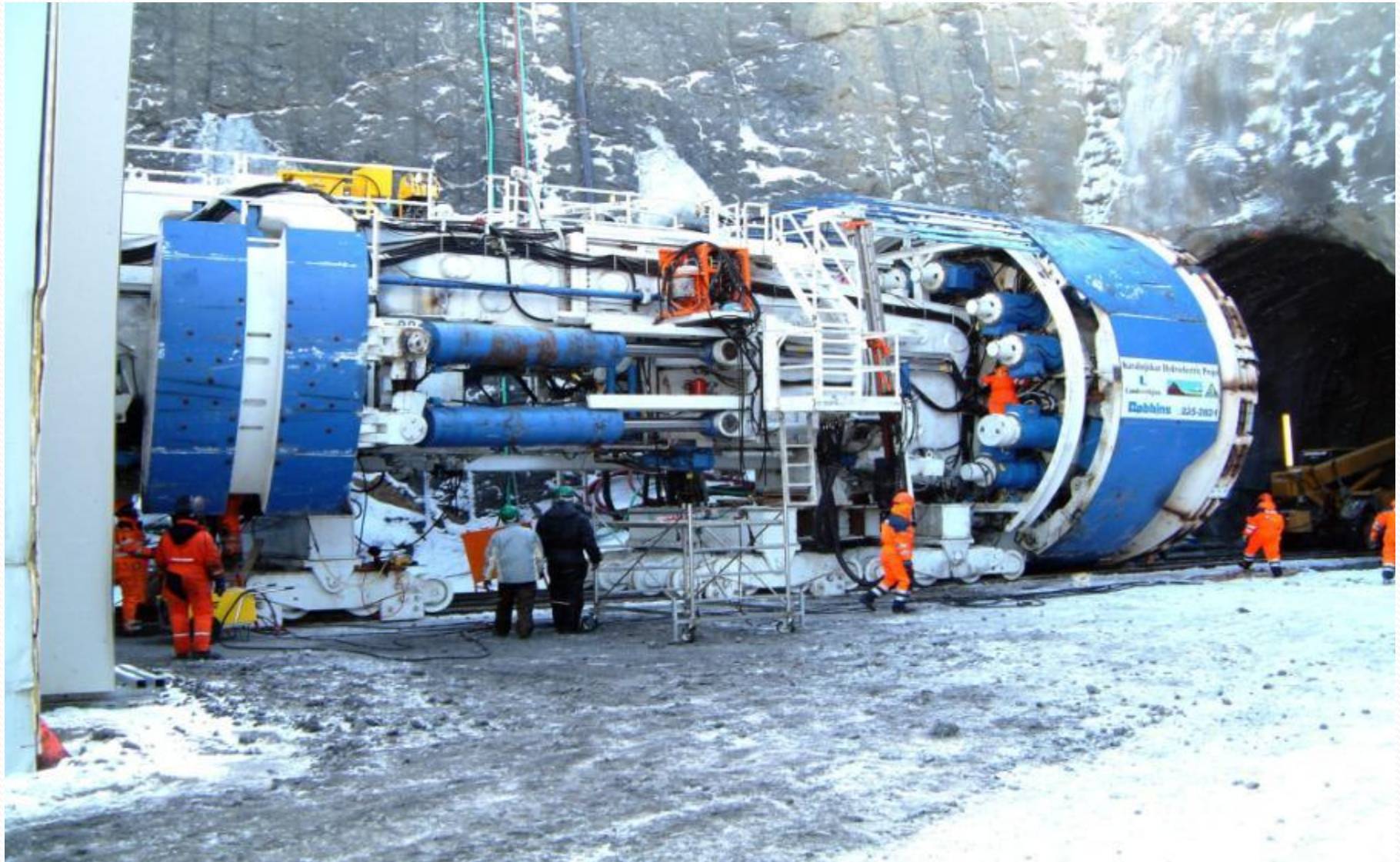


Inlet capacity	6x115 MW
Gross head	600 m
Energy production	4.600 GWh/a
Rated discharge	144 m ³ /s
Drainage area	1.806 km ²
	7
	-7,6 m
á rahnjú kar dam:	200 m
Le	700 m
	625 m a.s.l.
Area	57 km ²
Storage	2.100 GL
á dam:	H Desj08
L	1.100 m

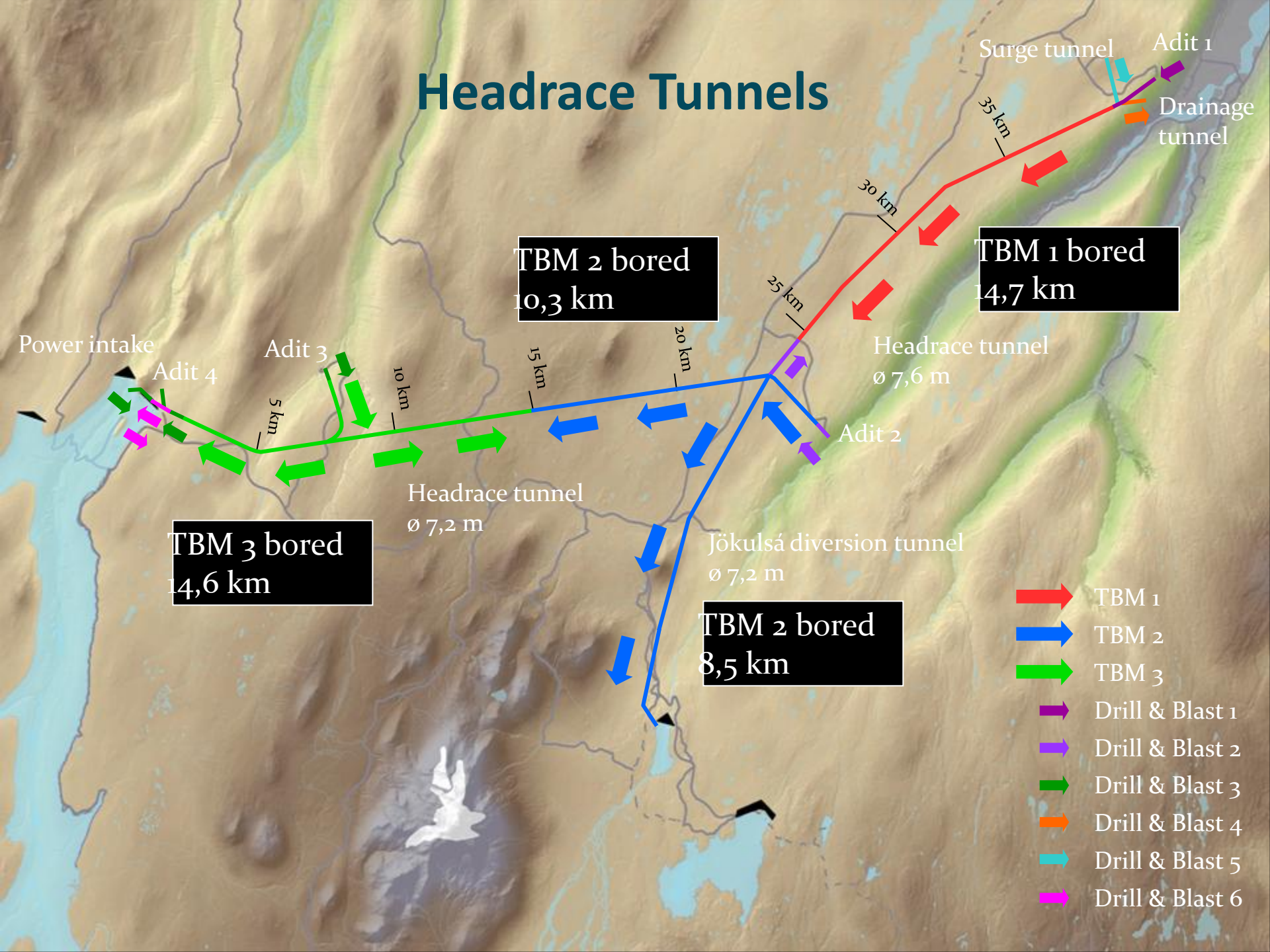
Kárahnjúkar Hydro Project



Tunnel Boring Machine (TBM 3)



Headrace Tunnels



Surge tunnel
35 km
Adit 1
Drainage tunnel

TBM 2 bored
10,3 km

TBM 1 bored
14,7 km

Power intake

Adit 4

Adit 3

TBM 3 bored
14,6 km

Headrace tunnel
ø 7,2 m

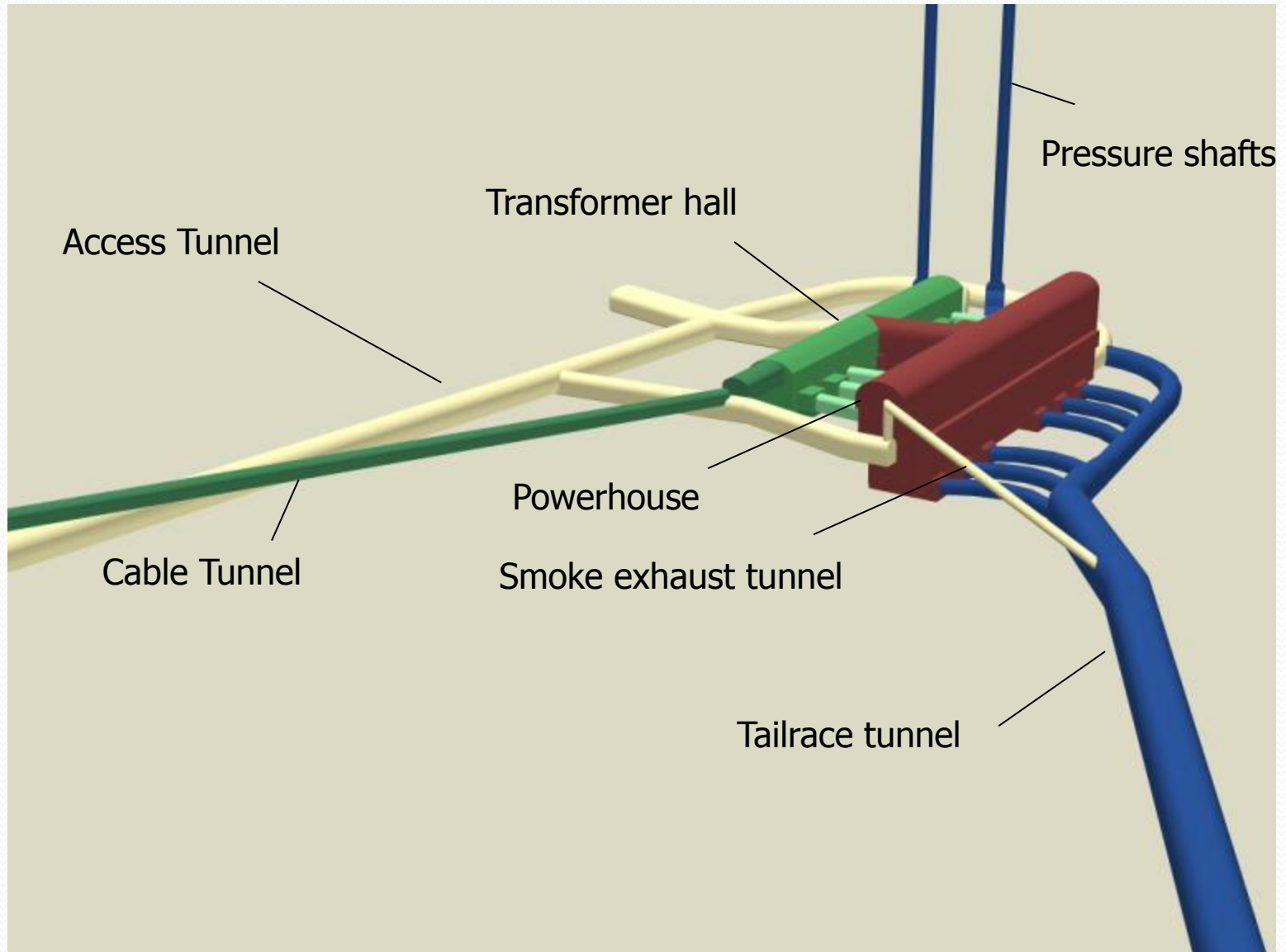
Headrace tunnel
ø 7,6 m

Adit 2

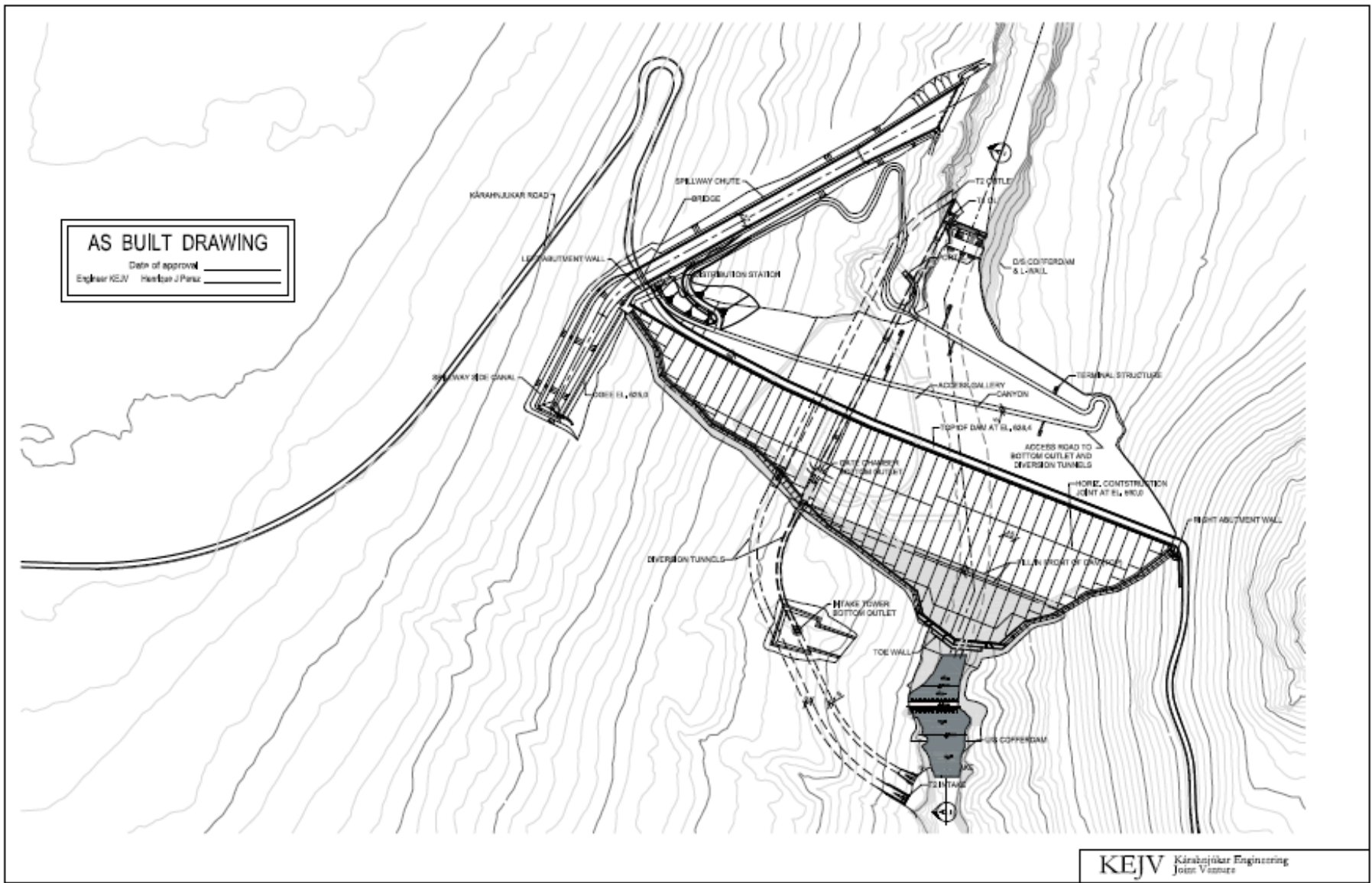
TBM 2 bored
8,5 km

Jökulsá diversion tunnel
ø 7,2 m

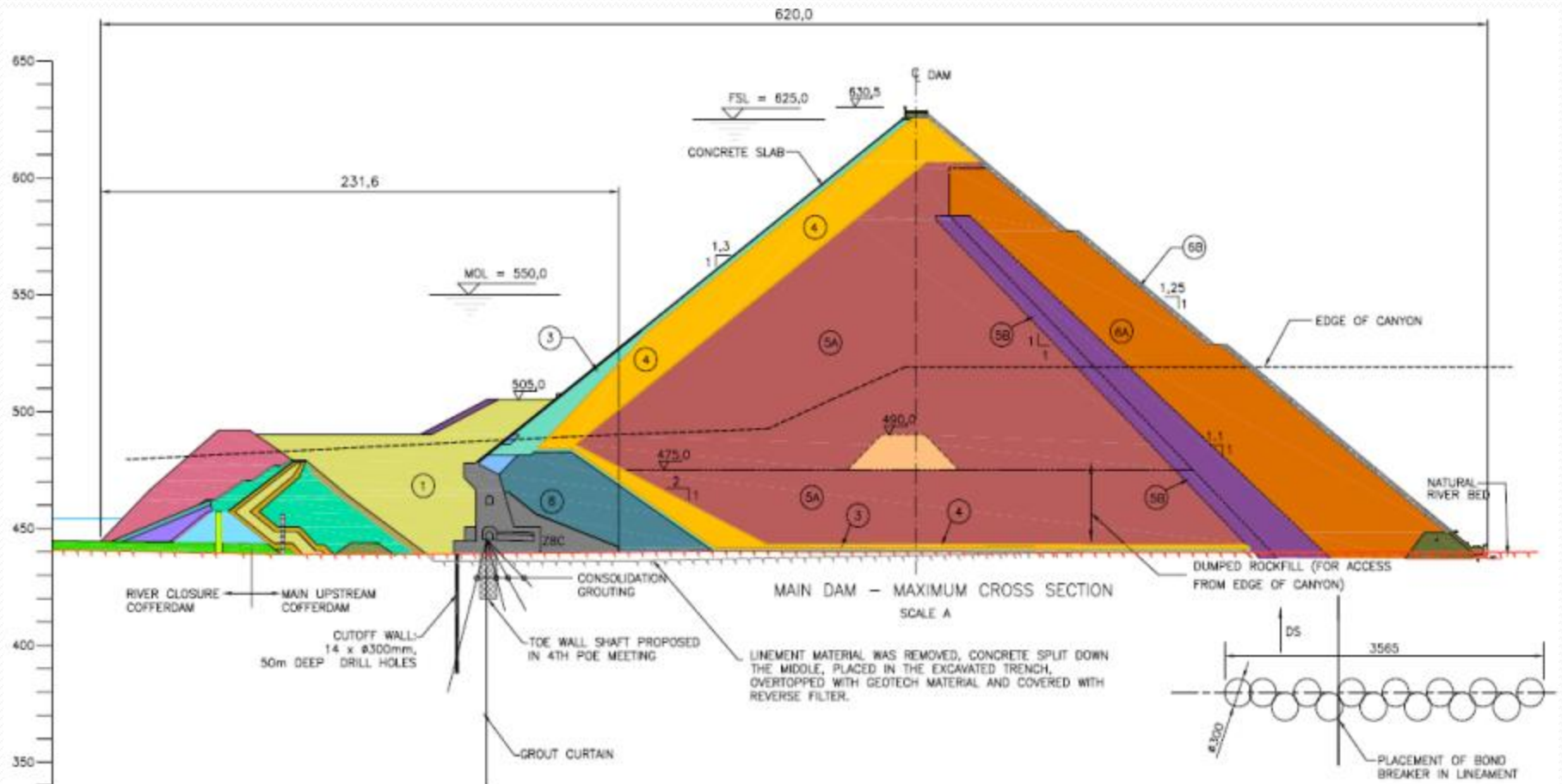
Underground structures



General Layout of Main Dam



Main Dam Cross Section



Kárahnjúkar Powerhouse



Challenges and Solutions

- **Mobilization in Remote Area**
- **Jökuldalur Canyon: Construction of Toe Wall**
- **Jökuldalur Canyon: Dam Fill**
- **Plinth Construction**
- **Face Slab Construction**
- **Conclusion**



Mobilization: Challenges

Remote Area

Arrange
Accommodation
for >1200 persons

Erect Plants and
Workshops

River Diversion &
Dam Excavation

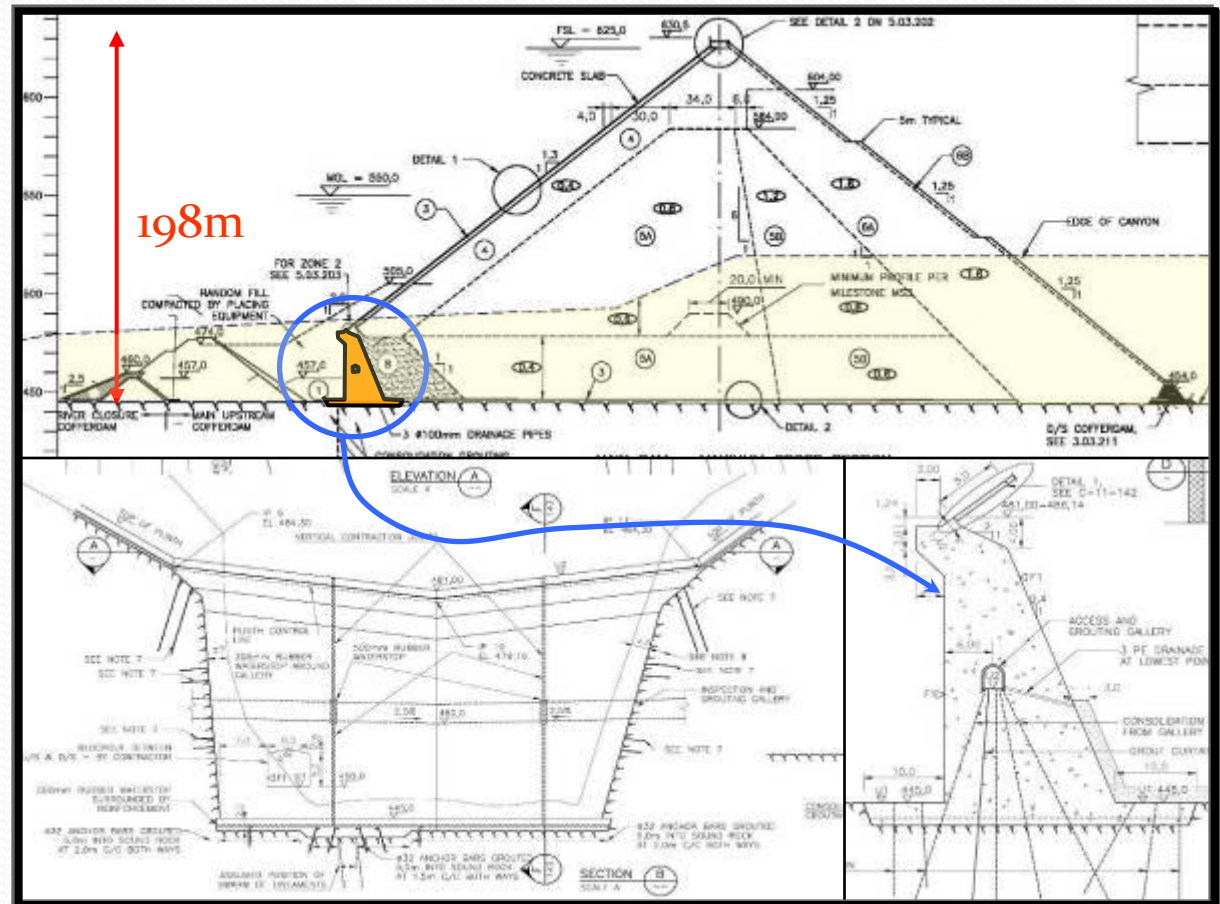


Construction camp at Kárahnjúkar Dam Site



Jökuldalur Canyon: Challenges

Toe Wall Construction



Jökuldalur Canyon: Solutions

Toe Wall Construction

Concrete
Distribution

Winterizing

Toe Wall
Completed



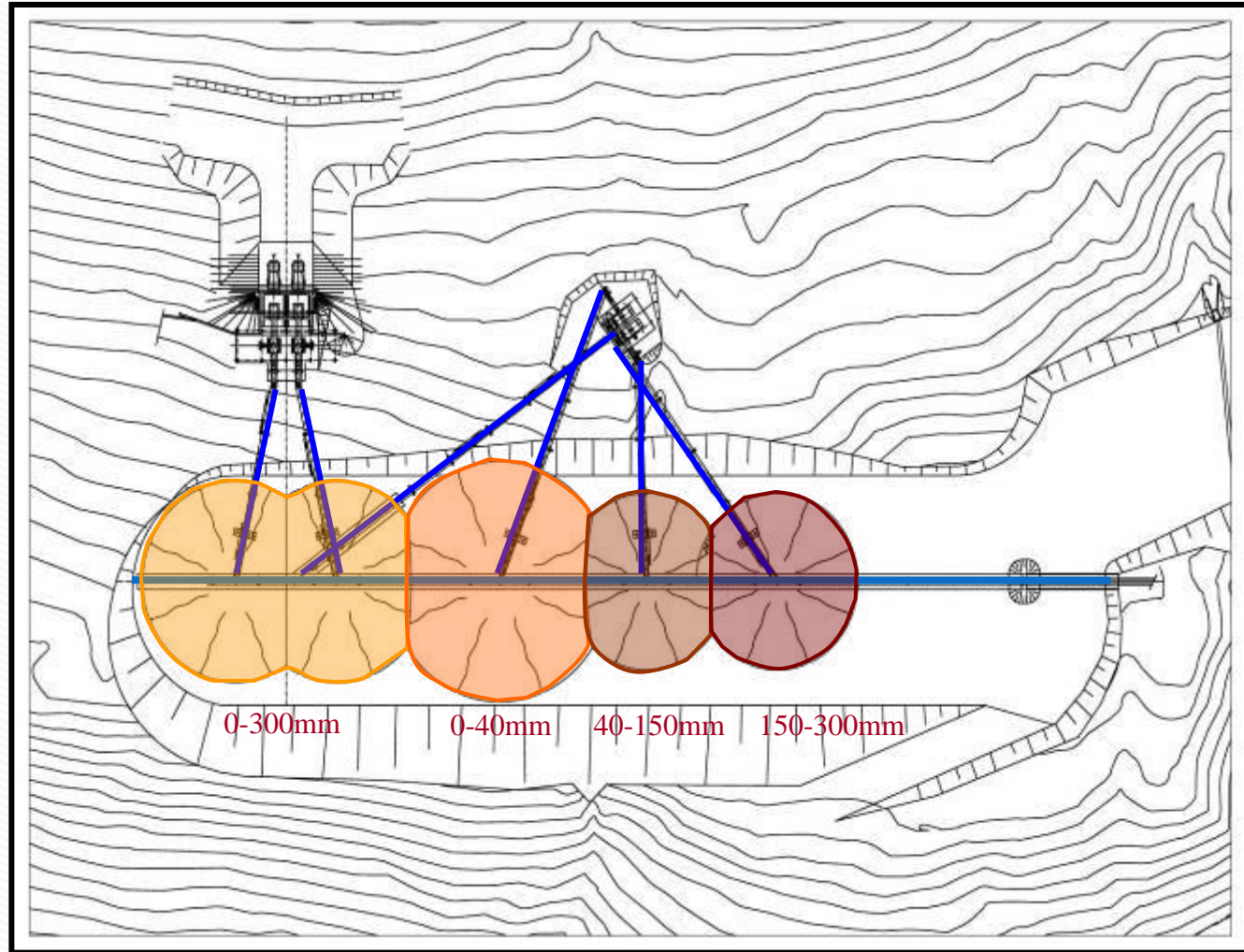
Jökuldalur Canyon: Challenges

Dam Fill



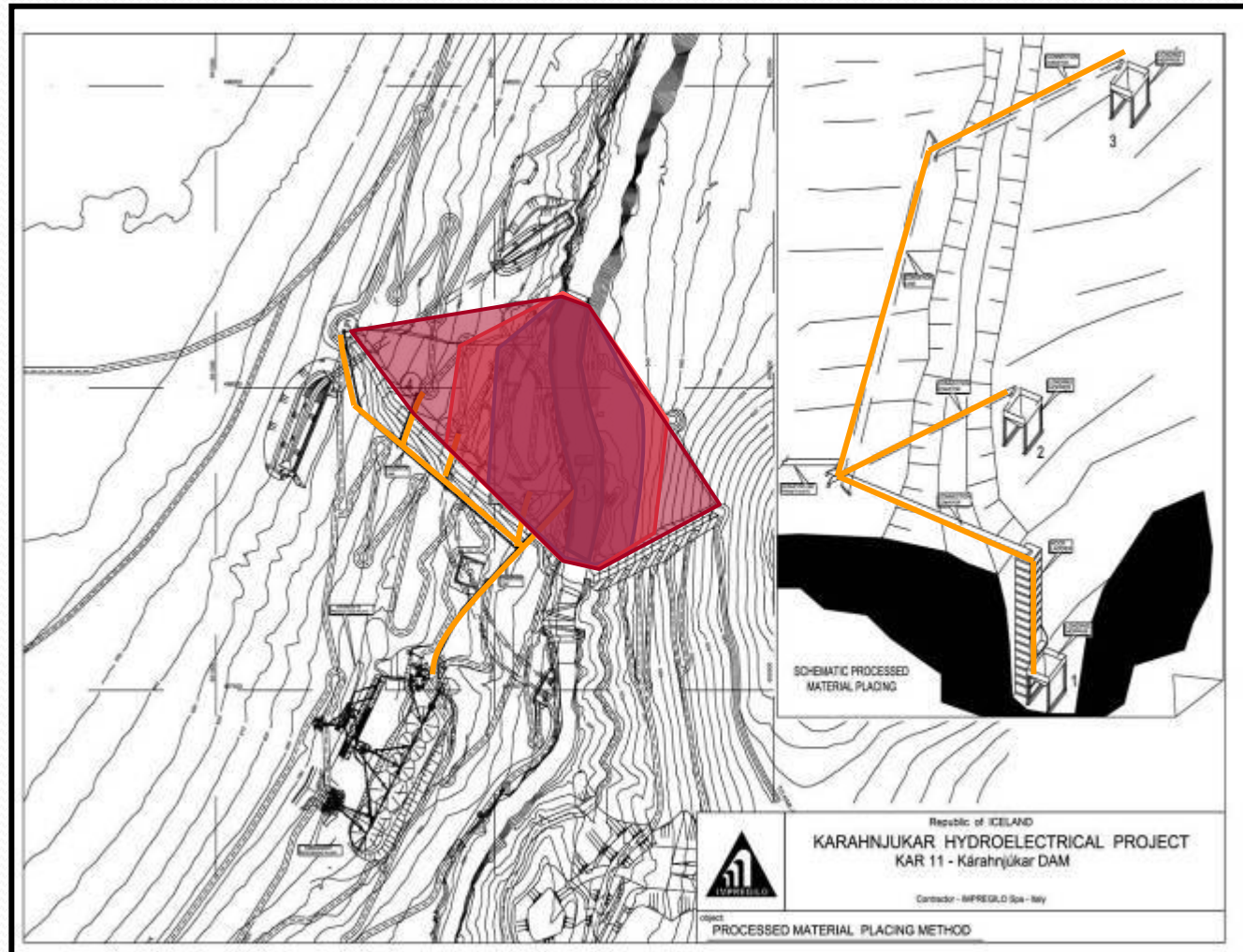
Jökuldalur Canyon: Solutions

Dam Fill



Jökuldalur Canyon: Solutions

Dam Fill



Plinth Construction: Challenges

Steep Slope and Arctic Weather



Plinth Construction: Solutions

Steep Slope and Artic Weather

Rockfall
protection

Erect protective
shelter

Winterizing



Face Slab Construction: Challenges

Schedule and Arctic Weather



Face Slab Construction: Solutions

Schedule and Artic Weather

Starter Slabs &
paving machine

Multi tasks

Winterizing



February 2006



June 2006



Winter 2008



Kelduá Dam



Conclusions

The Main Challenge was Time !!!



FERC Licensing

Susitna Licensing through the Federal Energy Regulatory Commission (FERC)

PRELIMINARY PERMIT

- ✓ Does not authorize construction or any land-disturbing activities
- ✓ Issued for a term up to 3 years
- ✓ Reserves site for permit holder; includes progress reports
- ✓ No dam or land ownership required

LICENSE

- ✓ Authorizes construction and operation of a hydropower project
- ✓ Issued for a term up to 50 years
- ✓ Includes measures to protect the environment
- ✓ Requires that licensee has or obtains ownership or easement on project lands and waters

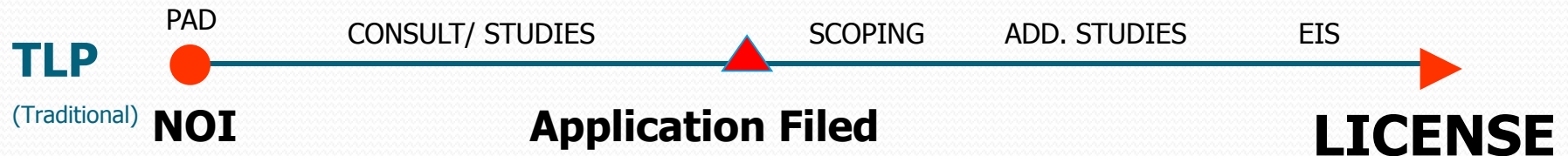
Licensing Process Comparison

NOI – Notice of Intent;

PAD – Preliminary Application Document;

EIS – Environmental Impact Statement;

PDEA – Preliminary Draft Environmental Assessment



Typical Licensing Process

INTEGRATED LICENSING PROCESS

PRE-FILING

Applicant files Initial
Proposal and Information
Document

FERC Holds Scoping
Meetings and Solicits
Public Comment

Applicant conducts
studies, if needed

Applicant Prepares
Application

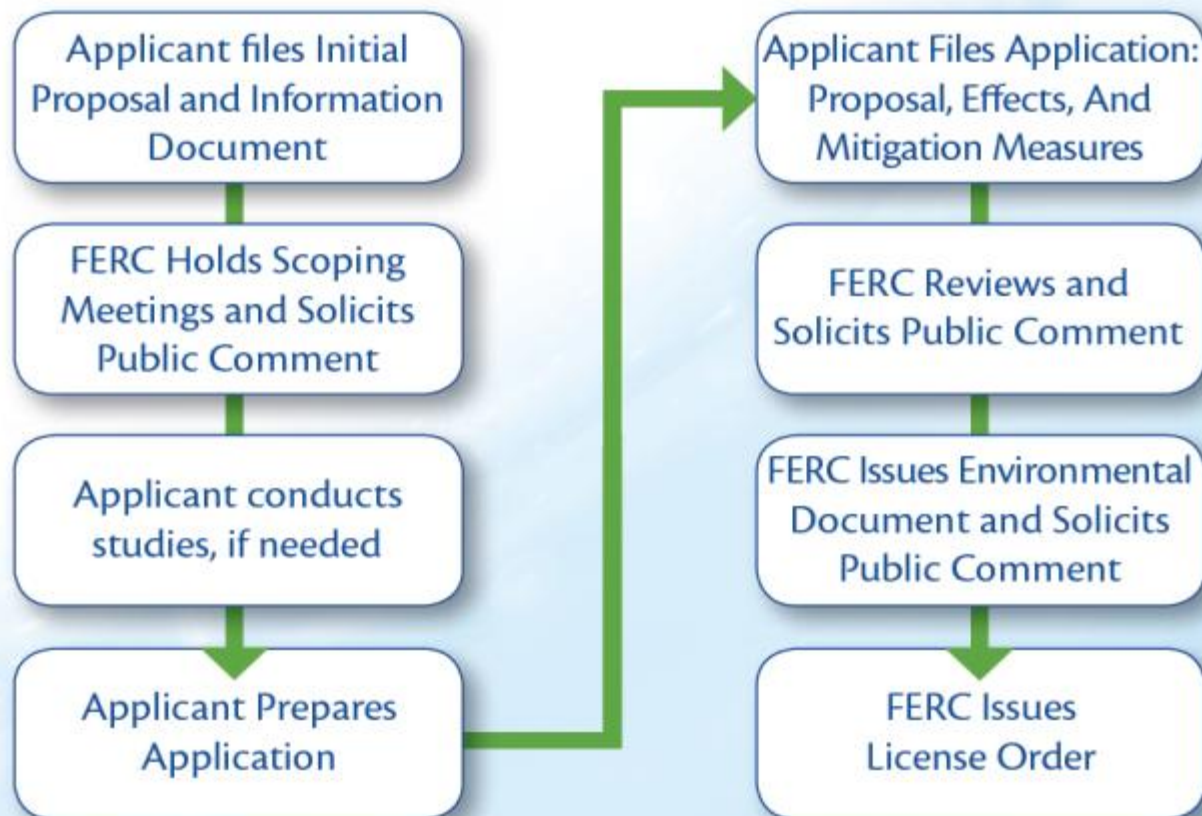
POST-FILING

Applicant Files Application:
Proposal, Effects, And
Mitigation Measures

FERC Reviews and
Solicits Public Comment

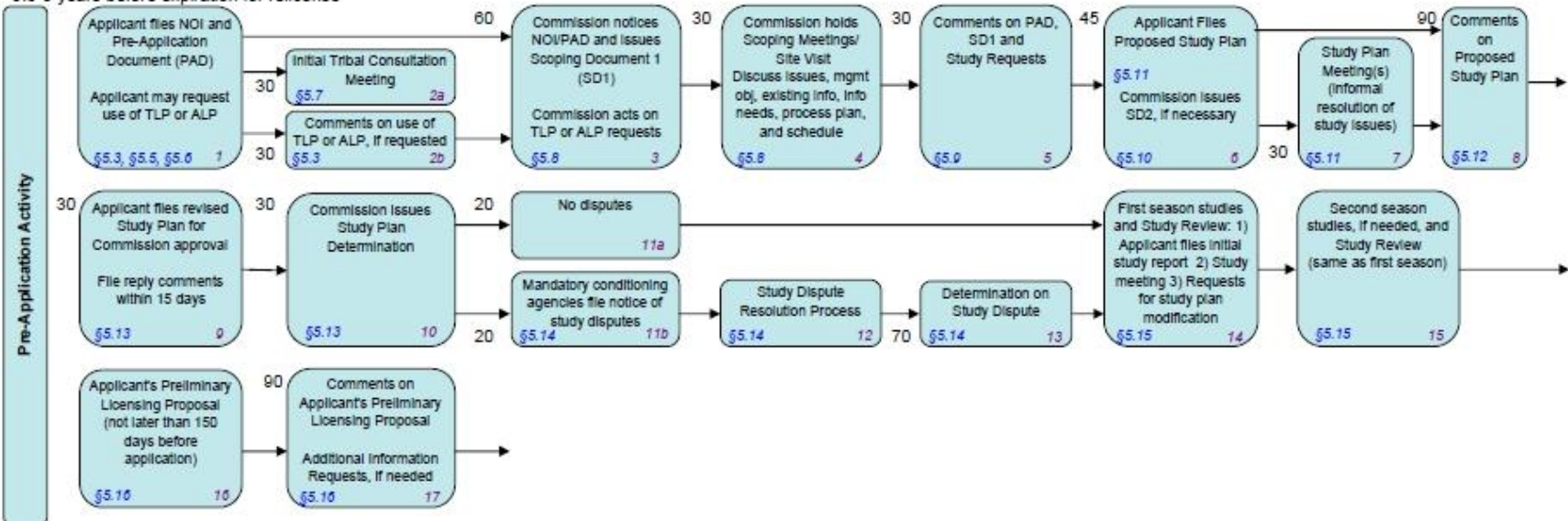
FERC Issues Environmental
Document and Solicits
Public Comment

FERC Issues
License Order

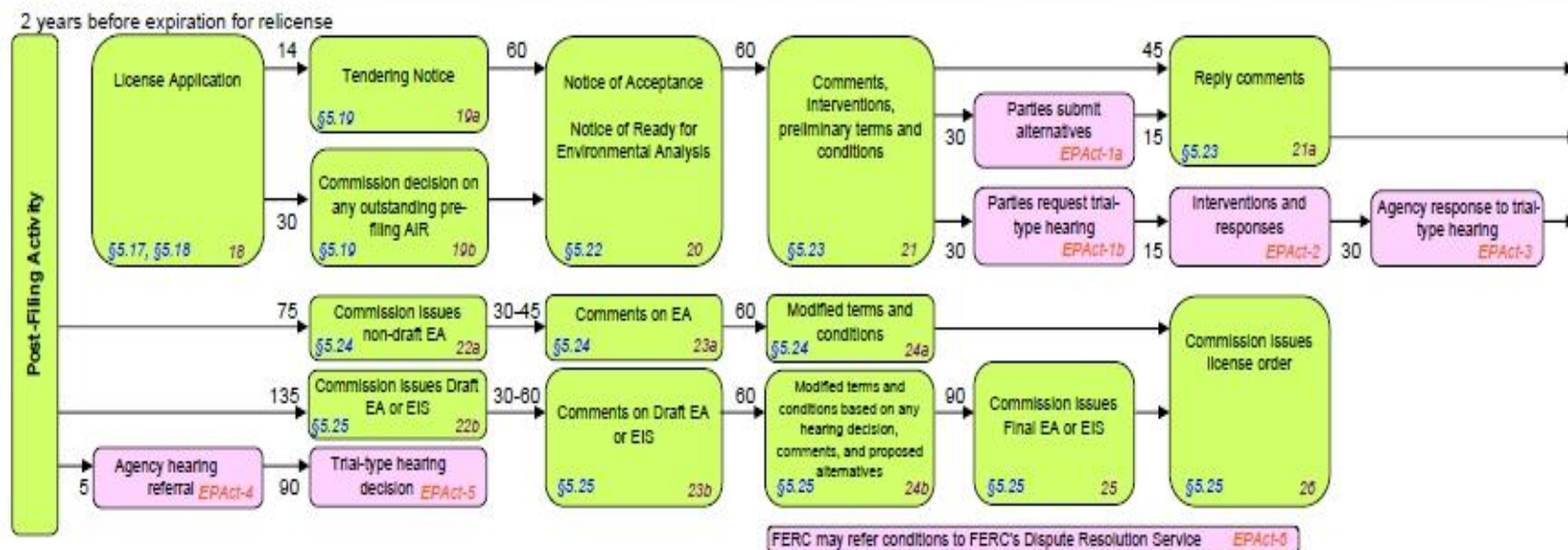


Pre Filing Activity

5.5-5 years before expiration for relicense

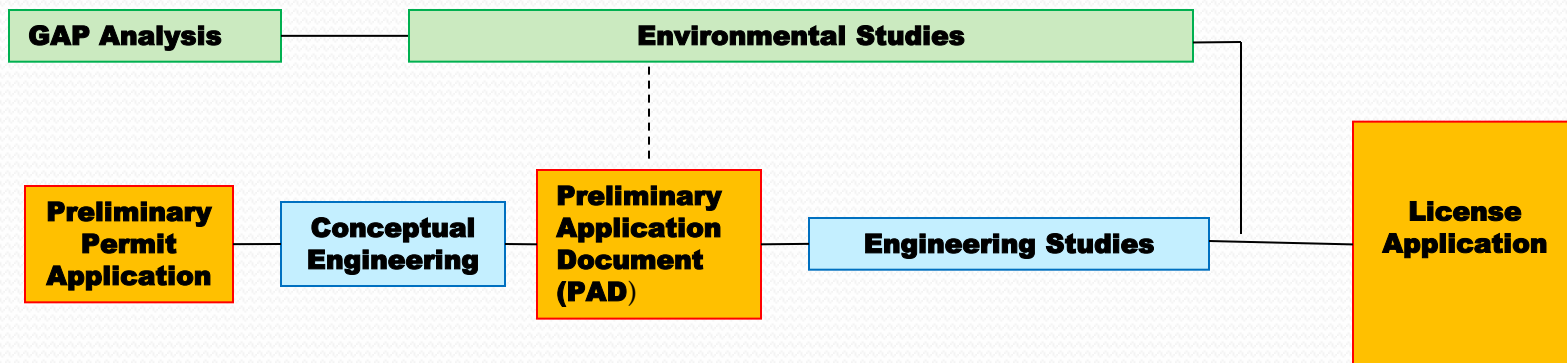


Post Filing Activity



AEA's Licensing Strategy

- Early Engagement of Resource Agencies and Other Stakeholders to Identify Critical Study Needs
- Maximizing Use of 1980s Environmental Study Work (Gap Analysis) to Minimize Time and Cost of New Studies
- Strong Commitment to Environmental Protection and Enhancement Measures



FERC Oversight Roles Affecting Power Cost

	FERC's Role
Need for Project	FERC EIS includes cost comparison between Project and Alternative Power Sources
Project Development Costs	License articles affect cost of Project construction – mainly related to environmental mitigation costs
Wholesale Power Costs	FERC will issue License regardless of what Project power costs
Power Cost to Consumers	None