

Elizabeth Fellows

From: Elizabeth Fellows
Sent: Thursday, 31 October 2019 12:17 PM
To: Chris McKenna; Adrian Jeffreys
Subject: FW: Prem Pol Mtg - Bradfield Scheme.pptx
Attachments: Prem Pol Mtg - Bradfield Scheme.pptx

Some additions in yellow for consideration, and have also fixed some errant punctuation etc

Might be for notes/verbal rather than in the slides, but do you want to make the distinction between ongoing supply solutions vs emergency solutions, and that infra that effectively creates additional water for 'new' ag does not drought-proof (and can create more people impacted by drought when it hits?)

Also for verbal if conversation goes that way – cost difference between eg. 2007-2019 is only inflation – doesn't take into account any increases (relative to inflation) such as labour, materials, detail and changes to design etc.

From: Adrian Jeffreys <adrian.jeffreys@premiers.qld.gov.au>
Sent: Thursday, 31 October 2019 11:24 AM
To: Elizabeth Fellows <elizabeth.fellows@premiers.qld.gov.au>; Chris McKenna <Chris.McKenna@premiers.qld.gov.au>
Subject: Prem Pol Mtg - Bradfield Scheme.pptx

Check this for errors/issues

AJ

1938 Bradfield scheme

- Dams on Tully, Herbert and Burdekin Rivers (Hells Gates) with water diverted west into Lake Eyre Basin rivers
- Subsequent studies, including 1982 McNamara Report commissioned by Bjelke Petersen Government, identified major problems
- Bradfield proposed using gravity to move water – not possible
- Extremely expensive to build and operate
- Major environmental problems (dams in Wet Tropics World Heritage area, GBR issues, salinity in western soils)

2007 Burdekin to Wivenhoe Scheme

- Option considered to augment SEQ water supply during Millennium Drought
- 1000km and up to 8 pumping stations
- Construction: \$7b – \$14b in 2007 dollars (\$9- \$18b in 2019)
- Operating cost: \$5,000 - \$10,000/ML if in continuous use; \$255,000 - \$480,000/ML if used as emergency measure
- Other options significantly cheaper, (e.g desalination \$2,500 - \$3,500/ML)

Long distance water infrastructure schemes can work

- South East Queensland Water Grid:
 - ~ \$6.9 billion, including:
 - Northern Pipeline Interconnector (95km Sunshine Coast to Brisbane) ~ \$867 million
 - Southern Regional Water Pipeline (120km Gold Coast to Brisbane) ~ \$858 million
 - Eastern Pipeline Interconnector ~ \$41 million
 - Wivenhoe Dam to Cressbrook Dam (38km Brisbane to Toowoomba) ~ \$187 million
 - Ernest Henry Mine to Cloncurry (38km) ~ \$42.5 million
 - Haughton Duplication Pipeline (36.5km) ~ \$195 million
- Sunwater:
 - 11 other bulk water pipelines (2100km)

Assessing Future Options

- Long distance water transfer generally only viable for customers willing to pay the price (e.g. industry, mines, urban communities)
- Other options (e.g. water efficiency measures, new dams, desalination) usually much cheaper
- Queensland Bulk Water Opportunities Statement (updated annually) sets out principles and projects

Possible Southern Downs pipeline

- Unless there is significant rainfall in the next 12- 24 months, Warwick is at severe risk of running out of water
- Water carting is not feasible (population too large) and new groundwater sources unlikely to be sustainable
- Urgent work needed to find solutions
- One option is a pipeline connection to Toowoomba
- This would be an extension of the SEQ water grid

Elizabeth Fellows

From: HOPE Paul <Paul.Hope@dnrme.qld.gov.au>
Sent: Thursday, 7 March 2019 12:21 PM
To: Roisin McCartney
Cc: HUNTER Virginia; HORTON Grant; CORNFORD Brent
Subject: FW: Diverting flood waters, Bradfield plan, Hielscher and Moore update
Attachments: Article about Bradfield Scheme update by Hielscher and Moore - Courier Mail 05.03.2019.pdf; The Bradfield Scheme and similar proposals.docx

Hi Roisin,

As discussed, we have a brief and a number of documents currently winging their way through MECS to DPC which cover off on the original request for some information and also provide some extra background etc on the whole Bradfield Scheme proposal.

Whilst that is happening, attached is a document I prepared a few years back and update as and when something relevant comes up, that gives a potted history of the Bradfield Scheme and responses to it over the last 80 odd years as well as some useful links and details of a few of the more recent studies that dabble around the edges of a Bradfield Scheme type proposal. Hopefully that will meet your immediate needs and the MECS item will find its way to you soon.

Happy to talk over what we have put together if you have any further queries after reading through this document.

Kind regards

Paul Hope
Principal Advisor
Water Supply Planning
Department of Natural Resources, Mines and Energy

Level 8, 1 William Street, Brisbane, Qld, 4000
PO Box 15456, City East, Qld, 4001
Phone: 07 3166 0164
Email: paul.hope@dnrme.qld.gov.au

From: HUNTER Virginia
Sent: 7 March 2019 12:04
To: HOPE Paul
Cc: CORNFORD Brent
Subject: FW: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Hi Paul – can you please call DPC – ASAP please, thanks



Virginia Hunter
Team Leader
Water Markets & Supply
Department of Natural Resources, Mines and Energy

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W: www.dnrm.qld.gov.au

From: CORNFORD Brent
Sent: Thursday, 7 March 2019 12:01 PM
To: HUNTER Virginia
Subject: FW: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Hi Virginia,

Can you please give Roisin (Roshine – pronunciation) a call quite urgently?

Details in signature block below.

Regards

Brent Cornford
Executive Officer
Office of the Deputy Director-General – Water Markets and Supply
Department of Natural Resources, Mines and Energy

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Mobile: CTPI - Personal Information
Email: Brent.Cornford@dnrme.qld.gov.au

From: DLO DNRME
Sent: Thursday, 7 March 2019 11:58 AM
To: CORNFORD Brent; ODDG WMS
Cc: DLO DNRME
Subject: FW: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Hi Brent

Thank you for talking with me just now.

Can you please give Roisin (Roshine – pronunciation) a call quite urgently? She is just wanting to gain an understanding of our input.

Details provided in signature block below.

Many thanks!
Juliette



Juliette Vernyik
Departmental Liaison Officer
Department of Natural Resources, Mines and Energy

P: 3199 7888 M: CTPI - Personal Information
E: DLO.DNRME@dnrme.qld.gov.au
A: Level 36, 1 William Street, Brisbane, QLD 4000 PO BOX 15216, CITY EAST, QLD 4002



From: Roisin McCartney [<mailto:roisin.mccartney@premiers.qld.gov.au>]
Sent: Thursday, 7 March 2019 9:01 AM
To: DLO DNRME <DLO.DNRME@dnrme.qld.gov.au>
Subject: FW: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Hello again,

Further to my request, earlier in the week the DG, DPC is now asking for information (high level summary) on the Bradfield Scheme.

In particular:

- what it is
- how often it's been looked at
- what the findings have been and anything RE: current claims/versions (refer to email below)

I will give you a call about this at 10am after I return from a meeting.

Best regards,
Roisin McCartney



Roisin McCartney
Environment Policy
Department of the Premier and Cabinet

P 07 3003 9317
Level 30 1 William Street, Brisbane QLD 4000
PO Box 15185, City East, QLD 4002

From: Roisin McCartney
Sent: Tuesday, 5 March 2019 8:40 AM
To: 'DLO DNRME' <DLO.DNRME@dnrme.qld.gov.au>
Subject: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Good morning,

A few weeks ago you were able to provide me some excellent information about the suggestion we were receiving from many people about diverting flood waters to drought affected parts of Queensland.

This morning, the Courier Mail is reporting that Sir Leo Hielscher and Sir Frank Moore have proposed an update to the Bradfield Plan and consequently we anticipate we will receive much correspondence and possibly even a parliamentary question about this matter. Attached please find a copy of the article.

Would you be able to assist either by asking the author of this original letter to provide a response in relation to the ideas being proposed by Hielscher and Moore, or if easier if you could connect me to the relevant area, I would be happy to discuss with them to prepare a response.

Ideally we would be looking for the information by the end of the week, however I will let you know if this changes (e.g. Premiers Office asking for urgent information).

Thanks again for your assistance. Let me know if you have any questions or concerns.

Best regards,
Roisin McCartney



Roisin McCartney
Environment Policy
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PO Box 15185, City East, QLD 4002

From: DLO DNRME <DLO.DNRME@dnrme.qld.gov.au>
Sent: Tuesday, 19 February 2019 11:44 AM
To: Roisin McCartney <roisin.mccartney@premiers.qld.gov.au>
Cc: Corro DNRME Minister and DG <DNRMEMinisterandDG.Corro@dnrme.qld.gov.au>; DLO DNRME <DLO.DNRME@dnrme.qld.gov.au>
Subject: TRIM: RE: WATER/ Water

Hi Roisin

Please find attached DNRME's approved draft response.

ECU – please finalise in MECS (CTS 03489/19).

Kind regards,



Pamela Kearns
Departmental Liaison Officer
Department of Natural Resources, Mines and Energy
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From: Roisin McCartney [<mailto:roisin.mccartney@premiers.qld.gov.au>]
Sent: Tuesday, 12 February 2019 8:11 AM
To: DLO DNRME <DLO.DNRME@dnrme.qld.gov.au>
Subject: FW: WATER/ Water
Importance: High

Good morning DLO,

Could you please assist in preparing a response to the email (below) which suggests diverting flood waters to drought affected areas.

I would appreciate any response or advice that you might be able to provide by **COB Friday 22 February 2019**. A copy of the template for responding is attached.

Thanks so much for your assistance in relation to this matter.

Best regards,
Roisin McCartney



Roisin McCartney
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PO Box 15185, City East, QLD 4002

From: noreply@premiers.qld.gov.au <noreply@premiers.qld.gov.au>
Sent: Monday, 4 February 2019 5:43 PM
To: The Premier <The.Premier@premiers.qld.gov.au>
Subject: WATER/ Water
Importance: High

Response: NO

Subject: Water

Title: CTPI - Personal Information

First Name: CTPI - Personal Information

Family Name: CTPI - Personal Information

Address: CTPI - Personal Information

Town: CTPI - Personal Information

State: CTPI - Personal Information

Postcode: CTPI - Personal Information

Comment:

Has it ever been suggested that a water system be created to take the surplus water south. Mining Companies have a huge number of earth moving and mining equipment which could be used as a contra Deal to link rivers, valleys and waterways to divert flood waters. Think what it could for that land affected by drought, farmers poverty would be eased, esp if a leaky weir system could be put in place. Australia has made huge steps with water reticulation, look at the Snowy River Scheme. Just a thought.

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The Bradfield Scheme and similar proposals

Paul Hope – updated March 2019

History

In 1938 Dr John Bradfield proposed a scheme whereby water would be extracted from one or more of the Tully, Herbert or Burdekin rivers, pumped over the Great Dividing Range and then distributed through a system of rivers, channels, pipelines and storages to water users across western areas of Queensland and other States. This Courier Mail article was written by Dr Bradfield himself at the time - <http://trove.nla.gov.au/ndp/del/article/38731715>.

Although there were slight variations to the proposal, the general premise was to enable irrigation of vast areas of land, quoted as 60,000 square miles (15,500,000 hectares, roughly twice the size of Tasmania) and thereby also support communities and other industries.

Similar 'proposals' had been made earlier that alluded to the possibility of sending water inland either to irrigate land or create an inland sea that would result in increased rainfall over adjacent land thereby making it more usable.

Even at the time, Dr Bradfield's proposal was considered to be technically unfeasible and uneconomic. Criticism centred on issues of water availability and losses as well the costs that would be involved with construction and operation of such a scheme. As early as the mid-1940s the Commonwealth Government was writing letters that highlighted the technical issues, lack of knowledge and costs that would prohibit development of such a scheme. Indeed, as early as 1945 the Commonwealth Government had a 'standard reply' for enquires on the proposal.

The National Archives of Australia has put together a potted history of the Bradfield Scheme and similar proposals as well as a variety of replies and other related correspondence. Although it is intended for use by schools, the document does give an interesting feel for how little has changed in the proposals to and the responses from government in the intervening 80 plus years - www.naa.gov.au/Images/watering inland_tcm16-36817.pdf.

A range of formal reports and documents on the Bradfield Scheme are held in the Library at the Eco-Sciences Precinct or are in long-term storage. Attached below is a table of the Library's catalogue of documents related to the Bradfield Scheme, as at November 2015. All of these documents are available to the public on request, with details of how to access them available here - <http://qldgov.softlinkhosting.com.au/liberty/libraryHome.do>.

Recent Consideration

The Queensland Government regularly receives suggestions, proposals and general correspondence suggesting that the Bradfield Scheme or a similar arrangement will 'drought proof' inland areas of the State, open up vast areas of land for irrigation or revitalise the Murray Darling Basin and would have various other benefits.

As well as investigations undertaken in the 1940s and the occasional ad hoc reviews of Bradfield Scheme style proposals that have occurred since, a number of reports were prepared in the early 1980s for the Coordinator General. A selection of these reports are listed in the attached table.

During the Millennium Drought the Beattie government commissioned consultants to investigate the option of piping water from Burdekin Falls Dam, inland of Townsville, to SEQ in order to provide a drought supply option (<http://statements.qld.gov.au/Statement/Id/51970>). Consideration was given to sizing the scheme such that it would be able to meet various percentages of SEQ's water demand. Although this investigation was not of the usual Bradfield Scheme proposal, it did seek to quantify the volume of water required, as well as identify some key technical considerations and the costs of the scheme.

Consultants GHD prepared the report which was completed in October 2007 – http://levilentz.com/work/Classes/555/Refs_project_1/burdekin_seq_pipeline.pdf.

The volumes of water considered by GHD in its report ranged between 188 and 727 megalitres per day (68,000 to 265,000 megalitres per year). This is relatively small by comparison to most Bradfield Scheme proposals which often seek to transfer 1,000,000 megalitres per year or more.

In this case, the technical issues presented by the long and rather convoluted route could be overcome with the application of sufficient money. Because the route was entirely piped, water losses would be minimised, further improving the viability of the scheme from a technical point of view.

GHD calculated costs for water delivered to SEQ, across the range of pipeline capacities, to be between \$5,000 and \$10,000 per megalitre if the scheme was in use permanently. However, these costs would rise as high as \$255,000 to \$480,000 per megalitre if the scheme was only used once in 50 years on average as a drought response measure only. Treatment of the water would add a further \$150 to \$200 per megalitre to these costs. Construction costs in 2007 ranged from \$7,000 million to \$14,000 million. The size of water supply costs that could be paid by agricultural businesses would not approach even a fraction of the costs estimated by GHD.

Even for supply to a large urban centre with a high capacity to pay, the lower range costs would be in excess of alternative supply options such as desalination (estimated at around \$2,500 to \$3,500 per megalitre for 'ready to supply' water). As such, the economics of the proposal were not attractive.

Ultimately, the Bligh government decided not to progress the scheme any further on cost grounds alone - www.brisbanetimes.com.au/news/queensland/at-14-billion-bligh-says-no-thanks-to-burdekin-pipeline/2008/04/28/1209234712396.html.

In 2018, Townsville Enterprise Limited undertook a feasibility study of the proposed Hells Gates Dam in the upper Burdekin River catchment and an associated irrigation scheme. The Hells Gates Dam is often identified as one of the critical storages that would supply water into a Bradfield Scheme type proposal. The study was funded by the Australian Government's National Water Infrastructure Development Fund and the final report documents can be found on the Queensland Government's library here - <http://tinyurl.com/y7wob26p>.

Construction of a dam and irrigation scheme for approximately 50,000 hectares was given a preliminary estimated cost in excess of \$5 billion. That figure is considered likely to increase if detailed dam design work and a wide range of outstanding technical and environmental matters were to be addressed and costed. Furthermore, construction of such a large storage upstream of existing infrastructure in the catchment, including Burdekin Falls Dam, would potentially impact on the capability of that existing infrastructure to supply its own customers.

Whilst the GHD and Townsville Enterprise Limited investigations do not consider all of the elements of a traditional Bradfield Scheme proposal, they do give an indication of some of the costs involved with constructing and operating a scheme of this nature. The storage and pipeline considered in these assessments would be just a small part of a Bradfield Scheme proposal capable of providing reliable water supply to very large areas and, as such, costs for larger and more elaborate schemes would grow commensurately.

On a related note, in 2010, the Australian Government prepared a report that discusses the nature of proposals for large scale water transport and the challenges that they face. This report presents a summary of a variety of long distance water transport proposals from across Australia, the challenges that they can face and the practicality of constructing and operating them. The report can be found online here: <http://pandora.nla.gov.au/pan/123443/20101108-1110/www.environment.gov.au/water/publications/action/pubs/moving-water.pdf>.

Current standard response

At present, the standard response to suggestions for Bradfield Scheme type proposals concentrates on the following key points:

- The availability of water allowing for compliance with Water Resource Plan flow objectives
- Variability of water availability across North Queensland year to year
- Losses of water due to seepage and evaporation in what is an arid area much of the time
- Need for large storage/s to maintain water availability during dry years
- Technical considerations due to pumping requirements including the availability of power
- Issues and costs for using onsite renewable energy generation to power pumps
- Construction issues for channels, pipelines and storages including locating suitable sites
- Remoteness of much of the area presenting challenges during construction and operation
- Environmental impacts on flora and fauna due to changing flow regimes of watercourses
- Impacts on groundwater recharge if water is redirected away from aquifer recharge areas
- Variability in the demand for water, especially during wet years
- Availability of alternative water sources which have lower costs, in particular groundwater
- Ability and willingness of potential users to pay for water
- Impacts on the existing Burdekin Falls Dam located downstream of the proposed Hells Gates Dam

The summary response for proposals includes:

- Further investigations are needed to more accurately quantify the volumes of water that would be available to such a scheme, in general, though the large volumes of water

suggested for extraction from North Queensland's rivers would not be available at all or at least in all years

- A range of technical (including engineering) and environmental issues would need to be addressed, in particular noting that droughts and floods are a natural feature of inland watercourses and disrupting that would have consequences for flora and fauna
- The demand for water across inland Queensland and the downstream southern states, especially considering the likely very high costs of the water, is unknown and would be expected to be highly variable from year to year
- The costs of constructing and operating such a scheme would result in water being too expensive for nearly all users, in particular agricultural businesses which are the usually quoted beneficiaries of such proposals

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Library Catalogue Search Result

Selected Bibliography

Results 1-14 of 14

TITLE	AUTHOR	COPY CLASSIFICATION	STATUS
Bradfield scheme		333.91 BRA	Available
The Bradfield scheme: comments	Nimmo, W. H. R Bradfield, J. J. C	333.91 BRA 1947	Available
The Bradfield concept, preliminary study: a report prepared for the Co-ordinator-General	Bradfield, J. J. C	333.91 BRA 1982	Available
Report on the hydrology of the Bradfield Scheme	Amprimo, John Felix Henry, K.T		
The Bradfield concept, preliminary study: executive summary of a report prepared for the Co-ordinator-General	Bradfield, J. J. C	333.91 BRA 1982	Available
The Bradfield Concept: further investigations 1983-84: a report prepared for the Co-ordinator General.		333.91 CAM 1984	Available
The Bradfield Concept: further investigations 1983-84: draft: a report prepared for the Co-ordinator General.		333.91 CAM 1984	Available
The revised Bradfield scheme: the proposed diversion of the upper Tully, Herbert, Burdekin Rivers on to the inland plains of north and central Queensland: proposal of Queensland N.P.A. Water Resources Sub-Committee	Heidecker, Eric Stainkey, Roy Bradfield, J. J. C Katter, Bob	333.91 BRA 1981	Available
The Bradfield concept: further investigations 1983-1984 Inception report.		628.1109943 BRA 1984	Available
The Bradfield concept: further investigations 1983-1984 proposal for consultant services.		628.1109943 BRA 1983	Available
Review of long-term prospects for development of mineral resources in the western sector of the Bradfield Scheme.	Hofmann, Gerhard W	REC	Available

TITLE	AUTHOR	COPY CLASSIFICATION	STATUS
Bradfield scheme for "watering the inland": meteorological aspects; (a) possibilities of climatic amelioration and (b) rainfall characteristics of river basins proposed to be harnessed		627.5209943 BRA 1945	Available
Watering inland Australia	Bradfield, J. J. C	628.1109943 BRA 1941	Available
Queensland: the conservation and utilisation of her water resources	Bradfield, J. J. C	333.91 BRA 1938	Available

<http://qldgov.softlinkhosting.com.au/liberty/opac/search.do?mode=ADVANCED&action=search&queryTerm=bradfield&includeNonPhysicalItems=true&operator=AND&open=1>

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Pages 19 through 23 redacted for the following reasons:

Exempt Sch.3(6)(c)(i) Parliament privilege

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Elizabeth Fellows

From: Justin Carpenter
Sent: Thursday, 7 March 2019 1:25 PM
To: Elizabeth Fellows
Subject: FW: Diverting flood waters, Bradfield plan, proposed update
Attachments: Article about Bradfield Scheme update by Hielscher adn Moore - Courier Mail 05.03.2019.pdf

FYI



Queensland
Government

Justin Carpenter

Acting Executive Director
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From: Justin Carpenter
Sent: Thursday, 7 March 2019 1:04 PM
To: Julia Sheedy <julia.sheedy@premiers.qld.gov.au>
Cc: Lauren Pearce <Lauren.Pearce@premiers.qld.gov.au>; Mark Cridland <mark.cridland@premiers.qld.gov.au>;
Roisin McCartney <roisin.mccartney@premiers.qld.gov.au>
Subject: Diverting flood waters, Bradfield plan, proposed update

Hi Julia,

I understand you were chasing some points on the Bradfield scheme (or similar), and info on feasibility and recent consideration. Hope this helps.

Bradfield Scheme - background

- In 1938 Dr John Bradfield proposed a scheme whereby water would be extracted from one or more of the Tully, Herbert or Burdekin rivers, pumped over the Great Dividing Range and then distributed through a system of rivers, channels, pipelines and storages to water users across western areas of Queensland and other States.
- Dr Bradfield's proposal was determined to be technically unfeasible and uneconomic at the time (and subsequently).
- Critical challenges for the proposal (as well as other similarly large-scale flood diversion and water supply programs in the region) relate to:
 - (1) uncertain and variable water availability (particularly in arid areas, and with the potential to take away from other water users or the environment, in developed catchments);

- (2) large water losses (evaporation, seepage) – affecting reliability and with environmental impacts; and
- (3) significant construction and operation costs (with no prospect of economic return).
- Queensland Bulk Water Opportunities Statement (<https://www.dnrme.qld.gov.au/land-water/initiatives/bulk-water-statement>) has a page dedicated to the Bradfield Scheme (see page 51) that summarises the challenges associated with these schemes.
- There is no recent formal proposal that can be reviewed (re: Courier Mail Article, attached) but DNRME will, should one emerge.

Recent Consideration of the scheme

- The Queensland Government regularly receives suggestions, proposals and general correspondence suggesting that the Bradfield Scheme or a similar arrangement will drought proof inland areas of the State, mitigate floods, open up vast areas of land for irrigation or revitalise the Murray Darling Basin and would have various other benefits.
- As well as investigations undertaken in the 1940s and the occasional ad hoc reviews of Bradfield Scheme style proposals that have occurred since, a number of reports were prepared in the early 1980s for the Coordinator General.
- In 2007 - During the Millennium Drought the Beattie government commissioned consultants to investigate the option of piping water from Burdekin Falls Dam, inland of Townsville, to SEQ in order to provide a drought supply option. Consideration was given to sizing the scheme such that it would be able to meet various percentages of SEQ's water demand.
- In 2018, Townsville Enterprise Limited undertook a feasibility study of the proposed Hells Gates Dam in the upper Burdekin River catchment and an associated irrigation scheme. The Hells Gates Dam is often identified as one of the critical storages that would supply water into a Bradfield Scheme type proposal.
- In all cases, it was decided to not progress based on costs involved with constructing and operating a scheme of this nature. The storage and pipeline considered in these assessments would be just a small part of a Bradfield Scheme proposal capable of providing reliable water supply to very large areas and, as such, costs for larger and more elaborate schemes would grow commensurately.
- In 2010, the Australian Government also prepared a report that discusses the nature of proposals for large scale water transport and the challenges that they face. This report presents a summary of a variety of long distance water transport proposals from across Australia, the challenges that they can face and the practicality of constructing and operating them.



Queensland
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Elizabeth Fellows

From: Roisin McCartney
Sent: Thursday, 7 March 2019 12:43 PM
To: Justin Carpenter
Cc: Elizabeth Fellows
Subject: RE: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Further to the below.

FYI –

Queensland Bulk Water Opportunities Statement (<https://www.dnrme.qld.gov.au/land-water/initiatives/bulk-water-statement>) has a page dedicated to the Bradfield Scheme (see page 51) that summarises the challenges associated with these schemes.

From: Roisin McCartney
Sent: Thursday, 7 March 2019 12:39 PM
To: Justin Carpenter <justin.carpenter@premiers.qld.gov.au>
Cc: Elizabeth Fellows <elizabeth.fellows@premiers.qld.gov.au>
Subject: FW: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Hi Justin,

As per the DG's office request, please find attached detailed information from DNRME regarding the Bradfield Scheme.

Please note that there is no recent formal proposal that can be reviewed (re: Courier Mail Article) but that DNRME will should it become available.

Information summarised as follows:

Bradfield Scheme

- In 1938 Dr John Bradfield proposed a scheme whereby water would be extracted from one or more of the Tully, Herbert or Burdekin rivers, pumped over the Great Dividing Range and then distributed through a system of rivers, channels, pipelines and storages to water users across western areas of Queensland and other States.
- Even at the time, Dr Bradfield's proposal was considered to be technically unfeasible and uneconomic. Criticism centred on issues of water availability and losses as well the costs that would be involved with construction and operation of such a scheme.

Recent Consideration

- The Queensland Government regularly receives suggestions, proposals and general correspondence suggesting that the Bradfield Scheme or a similar arrangement will 'drought proof' inland areas of the State, open up vast areas of land for irrigation or revitalise the Murray Darling Basin and would have various other benefits.
- As well as investigations undertaken in the 1940s and the occasional ad hoc reviews of Bradfield Scheme style proposals that have occurred since, a number of reports were prepared in the early 1980s for the Coordinator General.
 - In 2007 - During the Millennium Drought the Beattie government commissioned consultants to investigate the option of piping water from Burdekin Falls Dam, inland of Townsville, to SEQ in order

to provide a drought supply option. Consideration was given to sizing the scheme such that it would be able to meet various percentages of SEQ's water demand.

- In 2018, Townsville Enterprise Limited undertook a feasibility study of the proposed Hells Gates Dam in the upper Burdekin River catchment and an associated irrigation scheme. The Hells Gates Dam is often identified as one of the critical storages that would supply water into a Bradfield Scheme type proposal.
- In all cases, it was decided to not progress based on costs involved with constructing and operating a scheme of this nature. The storage and pipeline considered in these assessments would be just a small part of a Bradfield Scheme proposal capable of providing reliable water supply to very large areas and, as such, costs for larger and more elaborate schemes would grow commensurately.
- In 2010, the Australian Government also prepared a report that discusses the nature of proposals for large scale water transport and the challenges that they face. This report presents a summary of a variety of long distance water transport proposals from across Australia, the challenges that they can face and the practicality of constructing and operating them..

Current standard response

- At present, the standard response to suggestions for Bradfield Scheme type proposals concentrates on the following key points:
 - The availability of water allowing for compliance with Water Resource Plan flow objectives
 - Variability of water availability across North Queensland year to year
 - Losses of water due to seepage and evaporation in what is an arid area much of the time
 - Need for large storage/s to maintain water availability during dry years
 - Technical considerations due to pumping requirements including the availability of power
 - Issues and costs for using onsite renewable energy generation to power pumps
 - Construction issues for channels, pipelines and storages including locating suitable sites
 - Remoteness of much of the area presenting challenges during construction and operation
 - Environmental impacts on flora and fauna due to changing flow regimes of watercourses
 - Impacts on groundwater recharge if water is redirected away from aquifer recharge areas
 - Variability in the demand for water, especially during wet years
 - Availability of alternative water sources which have lower costs, in particular groundwater
 - Ability and willingness of potential users to pay for water
 - Impacts on the existing Burdekin Falls Dam located downstream of the proposed Hells Gates Dam
- The summary response for proposals includes:
 - Further investigations are needed to more accurately quantify the volumes of water that would be available to such a scheme, in general, though the large volumes of water suggested for extraction from North Queensland's rivers would not be available at all or at least in all years
 - A range of technical (including engineering) and environmental issues would need to be addressed, in particular noting that droughts and floods are a natural feature of inland watercourses and disrupting that would have consequences for flora and fauna
 - The demand for water across inland Queensland and the downstream southern states, especially considering the likely very high costs of the water, is unknown and would be expected to be highly variable from year to year
 - The costs of constructing and operating such a scheme would result in water being too expensive for nearly all users, in particular agricultural businesses which are the usually quoted beneficiaries of such proposals

Please let me know if you require further information or clarification.

Best regards,
Roisin McCartney



Queensland
Government

Roisin McCartney
Environment Policy
Department of the Premier and Cabinet

P 07 3003 9317
Level 30 1 William Street, Brisbane QLD 4000
PO Box 15185, City East, QLD 4002

From: HOPE Paul <Paul.Hope@dnrme.qld.gov.au>
Sent: Thursday, 7 March 2019 12:21 PM
To: Roisin McCartney <roisin.mccartney@premiers.qld.gov.au>
Cc: HUNTER Virginia <Virginia.Hunter@dnrme.qld.gov.au>; HORTON Grant <Grant.Horton@dnrme.qld.gov.au>; CORNFORD Brent <Brent.Cornford@dnrme.qld.gov.au>
Subject: FW: Diverting flood waters, Bradfield plan, Hielscher and Moore update

Hi Roisin,

As discussed, we have a brief and a number of documents currently winging their way through MECS to DPC which cover off on the original request for some information and also provide some extra background etc on the whole Bradfield Scheme proposal.

Whilst that is happening, attached is a document I prepared a few years back and update as and when something relevant comes up, that gives a potted history of the Bradfield Scheme and responses to it over the last 80 odd years as well as some useful links and details of a few of the more recent studies that dabble around the edges of a Bradfield Scheme type proposal. Hopefully that will meet your immediate needs and the MECS item will find its way to you soon.

Happy to talk over what we have put together if you have any further queries after reading through this document.

Kind regards

Paul Hope
Principal Advisor
Water Supply Planning
Department of Natural Resources, Mines and Energy

Level 8, 1 William Street, Brisbane, Qld, 4000
PO Box 15456, City East, Qld, 4001
Phone: 07 3166 0164
Email: paul.hope@dnrme.qld.gov.au

Elizabeth Fellows

From: Chris McKenna
Sent: Thursday, 14 November 2019 9:28 AM
To: Elizabeth Fellows
Subject: FW: Urgent for 10AM tomorrow - Event Pack for Mayors meeting in Mt Isa


fyi

From: Chris McKenna
Sent: Thursday, 14 November 2019 9:27 AM
To: Tracey O'Meara <Tracey.O'Meara@premiers.qld.gov.au>
Subject: RE: Urgent for 10AM tomorrow - Event Pack for Mayors meeting in Mt Isa

Tracey – info below, which might need a minor update when DSDMIP gets back about MIPP – Thanks

PBN Relevant (possible Attachment)

s.73 - irrelevant information



Bradfield Scheme

6. Although many have called for a Bradfield-type scheme to take flood or rainwater from the ranges west of Cairns to central and southwest outback Queensland, such a scheme has not been demonstrated to be viable, with substantial engineering and cost challenges.
7. On 30 October 2019 the Premier called for the Federal Government to work with the Queensland Government on a smaller version of the Bradfield Scheme. This work could involve using the expertise of the Bureau of Meteorology. The intent is to work on a plan for the next fifty years, not just the short-term.
8. The Federal Government has not yet responded to the Premier's statements.

Speaking Points and Q&A

s.73 - irrelevant information



Chris McKenna
Environment Policy
Department of the Premier and Cabinet

Chris.McKenna@premiers.qld.gov.au
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Level 30, 1 William Street, Brisbane, QLD 4000
PO Box 15185, City East, QLD 4002

From: Tracey O'Meara <tracey.o'meara@premiers.qld.gov.au>

Sent: Wednesday, 13 November 2019 1:01 PM

To: Christina McConville <Christina.McConville@premiers.qld.gov.au>; Marina Ibrahim <marina.ibrahim@premiers.qld.gov.au>; Chris McKenna <Chris.McKenna@premiers.qld.gov.au>; Jillian Langford <Jillian.Langford@premiers.qld.gov.au>; Justin Carpenter <justin.carpenter@premiers.qld.gov.au>

Subject: Urgent for 10AM tomorrow - Event Pack for Mayors meeting in Mt Isa

Good Afternoon everyone – apologies in advance.

As you may be aware, the Premier is meeting with the Mayors of the following local governments next week in Mt Isa. Could you please provide input on the following topics to assist develop a PBN, talking points and Q&As. **Could you please provide your input by 10AM (Noon at latest) tomorrow, Thursday 14 November**, as the pack is due to ECU by 4pm Thursday. I apologise again for the short timeframe. Hopefully you will not need to go to agencies for information, given the work done this week for the visit. Call me if you have any difficulties, or other suggested

issues or opportunities for inclusion. If you have any existing Q&As or talking points I could use that would be appreciated.

Mayors:

Carpentaria*

Burke Shire*

Charters Towers

Cloncurry*

Doomadgee*

Etheridge*

Flinders*

McKinley*

Mt Isa*

Richmond*


(*NWMP related)

s.73 - irrelevant information

A large rectangular area of the document is redacted with a light grey fill and a red border. The text 's.73 - irrelevant information' is written in the top left corner of this area.

- Investing in water infrastructure and dams so that our productive farmers and agribusinesses can harvest our plentiful water and continue to be profitable through floods and drought. **(Chris)**

s.73 - irrelevant information

A large rectangular area of the document is redacted with a light grey fill and a red border. The text 's.73 - irrelevant information' is written in the top left corner of this area.



Queensland
Government

Tracey OMeara
Director
Economic Policy
Department of the Premier and Cabinet

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PO Box 15185, City East, QLD 4002



Proudly working with White Ribbon to create a safer workplace
Australia's campaign to stop violence against women

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Elizabeth Fellows

From: DCLO Admin
Sent: Wednesday, 13 November 2019 5:28 PM
To: Elizabeth Fellows
Cc: DCLO Admin
Subject: FW: TF/19/10101 and standard lines for Bradfield

Good afternoon

Please see the below approval from the PO for the amendment to this standard response.

Kind regards



Queensland
Government

Anita Trim

A/Customer Liaison Officer
Departmental and Customer Liaison Office
Department of the Premier and Cabinet

P 07 3003 9225 M CTPI - Personal Information
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PO Box 15185, City East, QLD 4002



From: Tim Linley [mailto:Tim.Linley@ministerial.qld.gov.au]
Sent: Wednesday, 13 November 2019 5:15 PM
To: DCLO Admin <dcloadmin@premiers.qld.gov.au>
Subject: RE: TF/19/10101 and standard lines for Bradfield

Thanks Leonie ok with the proposed amendments

From: DCLO Admin <dcloadmin@premiers.qld.gov.au>
Sent: Wednesday, 13 November 2019 3:14 PM
To: Tim Linley <Tim.Linley@ministerial.qld.gov.au>
Cc: DCLO Admin <dcloadmin@premiers.qld.gov.au>
Subject: FW: TF/19/10101 and standard lines for Bradfield

Hi Tim

Just following up on the email below, please see attached response, we've a couple of queries of numbers in the below – I've tracked some changes, grateful if you could advise if you approve.

Happy to discuss direct – in particular, we presume 'regional' refers to Sunwater, but not sure if anything else is included.

Kind regards



Queensland
Government

Leonie McGorry

Customer Liaison Officer
Departmental and Customer Liaison Office
Office of the Director-General
Department of the Premier and Cabinet

P 07 3003 9446 M CTPI - Personal Information E leonie.mcgorry@premiers.qld.gov.au
Level 40, 1 William Street, Brisbane QLD 4000 PO Box 15185, City East, QLD 4002

Please consider the environment before printing this email.



From: Elizabeth Fellows <elizabeth.fellows@premiers.qld.gov.au>
Sent: Wednesday, 13 November 2019 11:26 AM
To: DCLO Admin <dcloadmin@premiers.qld.gov.au>
Subject: RE: TF/19/10101 and standard lines for Bradfield

Hi Sharni, no news on this one I presume?

Dr Elizabeth Fellows

Director | Environment Policy | DPC
P 07 3003 9489 | M CTPI - Personal Information

From: DCLO Admin <dcloadmin@premiers.qld.gov.au>
Sent: Friday, 8 November 2019 2:35 PM
To: Elizabeth Fellows <elizabeth.fellows@premiers.qld.gov.au>
Cc: Chris McKenna <Chris.McKenna@premiers.qld.gov.au>; DCLO Admin <dcloadmin@premiers.qld.gov.au>
Subject: RE: TF/19/10101 and standard lines for Bradfield

Thank you Elizabeth, I have forwarded this to Tim for approval.

I will let you know as soon as we hear something back.

Kind regards



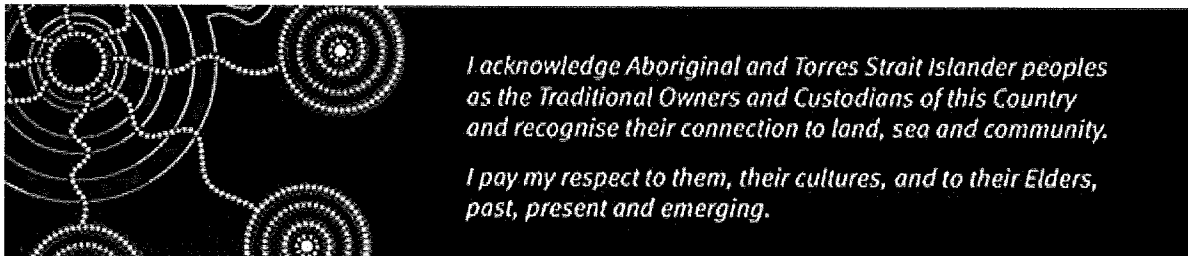
Queensland
Government

Sharni Sawyer

Assistant Departmental & Customer Liaison Officer
Departmental and Customer Liaison Office

Office of the Director-General - Department of the Premier and Cabinet

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*I acknowledge Aboriginal and Torres Strait Islander peoples as the Traditional Owners and Custodians of this Country and recognise their connection to land, sea and community.
I pay my respect to them, their cultures, and to their Elders, past, present and emerging.*

From: Elizabeth Fellows <elizabeth.fellows@premiers.qld.gov.au>
Sent: Friday, 8 November 2019 1:49 PM
To: DCLO Admin <dcloadmin@premiers.qld.gov.au>
Cc: Chris McKenna <Chris.McKenna@premiers.qld.gov.au>
Subject: FW: TF/19/10101 and standard lines for Bradfield

Hi Sharni

As discussed, we've a couple of queries of numbers in the below – I've tracked some changes, grateful if you could pass on when Tim is around.

Happy to discuss direct – in particular, we presume 'regional' refers to Sunwater, but not sure if anything else is included.

Cheers
Liz

Dr Elizabeth Fellows

Director | Environment Policy | DPC
P 07 3003 9489 | M CTPI - Personal Information

From: Tim Linley <Tim.Linley@ministerial.qld.gov.au>
Sent: Monday, 4 November 2019 9:29 AM
To: DCLO Admin <dcloadmin@premiers.qld.gov.au>
Subject: TF/19/10101 and standard lines for Bradfield

Good morning,

See below new standard lines responding to calls for a Bradfield Scheme for updating TF/19/10101.

Many thanks

Tim

The Queensland Government has committed \$176 million for Rookwood Weir, \$13.6 million for Emu Swamp Dam, \$16 million for works on raising Burdekin Falls Dam, \$215 million on the Houghton pipeline and \$170 million to upgrade the Fairburn Dam. Meanwhile the Federal Government is yet to provide any funding to actually start construction of new dams or weirs out of the four year old National Water Infrastructure Development Fund.

For a long-term solution we need the Federal Government to work with us on what the next steps could be for improving drought resilience in Northern and Western Queensland beyond the water projects we are already working on.

On 30 October 2019 the Premier called for the Federal Government to work with the Queensland Government on a smaller version of the Bradfield Scheme. This work would involve utilising the expertise of the Bureau of Meteorology on both current rainfall modelling and impacts of ~~on~~ design solutions [Query - was this trying to suggest the design would alter rainfall patterns? If not suggest proposed construction]. We need the best scientists and the best engineers in the nation working on a plan for the next fifty years, not just for the short-term.

There has been significant change since the original Bradfield proposal in 1938 with regional Queensland now having 19 dams, 64 weirs and barrages, 625730 kilometres of channels, 7976 major pumping stations and 2,2120 2,100 kilometres of pipeline infrastructure. [Correction assuming these are referring to Sunwater]. Sunwater delivers on average 1.3 million megalitres of water a year, almost enough to fill Sydney Harbour three times.

Weather conditions and the infrastructure environment has changed and impacts of diverting water on existing catchments and water supply for existing communities need to be considered. That's why we need to have all of the information and we to work together across all levels of government.



Tim Linley
Office of the Hon. Anastacia Palaszczuk MP
Premier of Queensland and Minister for Trade

P 07 3719 7043 M CTPI - Personal Information
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PO Box 15185 City East QLD 4002

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Elizabeth Fellows

From: Adrian Jeffreys
Sent: Thursday, 31 October 2019 12:03 PM
To: Chris McKenna; Elizabeth Fellows
Subject: FW: Bradfield Reports
Attachments: Bradfield scheme information for Adrian J.docx

Just check whether this changes anything in the slides



Queensland
Government

Adrian Jeffreys

Executive Director (Environment Policy)
Policy Division
Department of the Premier and Cabinet

E adrian.jeffreys@premiers.qld.gov.au P. (07) 30039314 M CTPI - Personal Information
Level 30 1 William Street, Brisbane QLD 4000
PO Box 15185, City East, QLD 4002

From: ZERBA Bernadette <Bernadette.Zerba@dnrme.qld.gov.au>
Sent: Thursday, 31 October 2019 11:59 AM
To: Adrian Jeffreys <adrian.jeffreys@premiers.qld.gov.au>
Cc: HORTON Grant <Grant.Horton@dnrme.qld.gov.au>
Subject: FW: Bradfield Reports

Hi Adrian

Please see attached information we could find. Not much comparative info but detail on costings and lengths of various pipeline proposals etc.

Kind regards



Queensland
Government

Bernadette Zerba
Executive Director
Water Supply, Natural Resources Division
Department of Natural Resources, Mines and Energy

P: (07) 3137 4265 M: CTPI - Personal Information
E: bernadette.zerba@dnrme.qld.gov.au
A: Level 3, 1 William Street, Brisbane QLD 4000
W: www.dnrme.qld.gov.au



From: THOMPSON Darren <Darren.Thompson@dnrme.qld.gov.au>
Sent: Thursday, 31 October 2019 11:58 AM
To: ZERBA Bernadette
Subject: FW: Bradfield Reports

Information that we could get together

darren

From: HORTON Grant <Grant.Horton@dnrme.qld.gov.au>
Sent: Thursday, 31 October 2019 10:18 AM
To: THOMPSON Darren; HOPE Paul
Subject: Bradfield Reports

Thanks Darren

Can you please insert the resulting table into this document please??

We are aiming to get this back to Adrian by lunch time.

Thanks
Grant

From: THOMPSON Darren <Darren.Thompson@dnrme.qld.gov.au>
Sent: Thursday, 31 October 2019 9:29 AM
To: HOPE Paul
Cc: HORTON Grant
Subject: Document1

Please populate BFD to SEQ

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Summary of key Bradfield Concept reports and metrics 31 October 2019

Purpose

The purpose of this paper is to summarise some of the key elements of the various versions of Bradfield Scheme concepts that have been looked at over time for Department of Premier and Cabinet. Multiple previous documents and summaries have been provided to DPC on the overall challenges associated with the concept.

Summary Table

The following table includes some example cost estimates for long distance pipelines that have been assessed over time in associated with the DNRME and its predecessors. These detailed cost estimates were developed via a quantities/materials ground up approach.

	Water supply to the Galilee Basin. Option A3 (Gorge Weir to Alpha proposals) ¹	Water supply to the Galilee Basin. Option B2 (Gorge Weir to Carmichael proposals) ¹	Burdekin to Moranbah Pipeline duplication (proposal) ¹	Burdekin to SEQ (proposal) ² NB capital cost includes raising BFD	Burdekin to SEQ (proposal) ² NB capital cost includes raising BFD
Length (km)	410	320	218	950	950
Design delivery capacity (ML/annum)	25,000	35,000	25,000	68,620	265,355
Number of pump stations	5	4	4	7	8
Total capital cost (\$ million)	969.5 circa 2012	937.2 circa 2012	588.6 circa 2012	6,908 circa 2007	13,976 circa 2007
Capital reflective \$/ML supplied	38,780	26,777	23,544	100,670	52,669
O&M (\$ million/annum)	15.8	18.4	10.6	689.9	1,455.4
O&M (\$/ML)	632	525	424	10,055	5,485

¹ Bowen and Galilee Basins Water Supply Strategy Study Report, DEWS 2012 – not publically released

² Direct Connection Pipeline – Burdekin to South East Queensland, GHD 2007 – not publically released

MacNamara Report 1982

In 1982 a report was prepared for the Coordinator General on the Bradfield Concept. This report examined the concept of diverting water for the Upper Herbert, Tully and Burdekin catchments for agricultural, mining an, industrial and electricity generation purposes. Water was to be transferred in the first instance to a Hells Gate in the upper Burdekin, augmented with further extraction form that storage and potentially the Flinders catchment (gulf flowing catchment) then transferred onto the Thomson River.

Some of the high level metrics from the concept level assessment was:

- First stage was approximately \$580 million to irrigate 11,09000 hectares of land and

- Final stage total of \$1380 million for 72,000 hectares of irrigated land.
- Total lift in the order of 400 m and in the order of 190 km of pipes, tunnels and channels.

These cost estimates are a concept level estimated in ~1980 dollars. These figures would need to be assumed to be much larger due to escalation and if more detailed assessment was undertaken costs would likely increase. The challenges are significant with this proposal and the study is of a concept level only.

Burdekin to SEQ Pipeline – GHD report 2007

GHD calculated costs for water delivered to SEQ, across the range of pipeline capacities, to be between \$5,000 and \$10,000 per megalitre if the scheme was in use permanently. However, these costs would rise as high as \$255,000 to \$480,000 per megalitre if the scheme was only used once in 50 years on average as a drought response measure only. Treatment of the water would add a further \$150 to \$200 per megalitre to these costs. Construction costs in 2007 ranged from \$7,000 million to \$14,000 million. The size of water supply costs that could be paid by agricultural businesses would not approach even a fraction of the costs estimated by GHD.

Even for supply to a large urban centre with a high capacity to pay, the lower range costs would be in excess of alternative supply options such as desalination (estimated at around \$2,500 to \$3,500 per megalitre for 'ready to supply' water). As such, the economics of the proposal were not attractive.

Sir Leo Hirschler Sir Frank Moore - Bradfield Reboot

Limited information available at time of forming a response.

Information on Irrigation Australia website <https://www.irrigationaustralia.com.au/news/knights-of-the-water-table-reboot-bradfield-scheme-in-grand-vision>

Sir Leo Hirschler and Sir Frank Moore said their updated Bradfield Scheme would open vast areas of the state to high-value food and fibre production while creating renewable hydroelectric power and saving the Great Barrier Reef from pollution.

It is reported that the cost of the Hirschler-Moore plan would be approximately \$15 billion, has the backing of senior Morrison Government figures, and they have been working on their "pre-feasibility" plan for four years. They agreed their project was a concept that would take 20 years to bring to life.

Tully River area

THE REVISED BRADFIELD SCHEME - THE PROPOSED DIVERSION OF THE UPPER TULLY, HERBERT, BURDEKIN RIVERS ON TO THE INLAND PLAINS OF NORTH AND CENTRAL QUEENSLAND PROPOSAL OF QUEENSLAND N.P.A. WATER RESOURCES STK 333.91 BRA 1981 SUB-COMMITTEE NOVEMBER 1981 .

The heart of the scheme (the Bradfield Scheme) without embellishment was the:

- Damming of the Tully River (near where the Koombooloomba Hydro Dam now stands).
- Diverting the Tully River (above this dam) into the Herbert River . Damming of the Herbert River at the Kooragwyn Dam Site (two miles upstream from junction with Cameron Creek) .
- Diverting the Herbert River (above the Falls) into the Burdekin River.
- Damming the Burdekin and diverting it into the Flinders.
- Diverting the Flinders by way of small channel into the Thompson, from where it would fill up Lake Eyre thus increasing the moisture content of Australia's dry interior - rain would thereby precipitate and the desert, it was hoped, would bloom.

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The Bradfield Scheme and similar proposals

Paul Hope – updated March 2019

History

In 1938 Dr John Bradfield proposed a scheme whereby water would be extracted from one or more of the Tully, Herbert or Burdekin rivers, pumped over the Great Dividing Range and then distributed through a system of rivers, channels, pipelines and storages to water users across western areas of Queensland and other States. This Courier Mail article was written by Dr Bradfield himself at the time - <http://trove.nla.gov.au/ndp/del/article/38731715>.

Although there were slight variations to the proposal, the general premise was to enable irrigation of vast areas of land, quoted as 60,000 square miles (15,500,000 hectares, roughly twice the size of Tasmania) and thereby also support communities and other industries.

Similar 'proposals' had been made earlier that alluded to the possibility of sending water inland either to irrigate land or create an inland sea that would result in increased rainfall over adjacent land thereby making it more usable.

Even at the time, Dr Bradfield's proposal was considered to be technically unfeasible and uneconomic. Criticism centred on issues of water availability and losses as well the costs that would be involved with construction and operation of such a scheme. As early as the mid-1940s the Commonwealth Government was writing letters that highlighted the technical issues, lack of knowledge and costs that would prohibit development of such a scheme. Indeed, as early as 1945 the Commonwealth Government had a 'standard reply' for enquires on the proposal.

The National Archives of Australia has put together a potted history of the Bradfield Scheme and similar proposals as well as a variety of replies and other related correspondence. Although it is intended for use by schools, the document does give an interesting feel for how little has changed in the proposals to and the responses from government in the intervening 80 plus years - www.naa.gov.au/Images/wateringinland_tcm16-36817.pdf.

A range of formal reports and documents on the Bradfield Scheme are held in the Library at the Eco-Sciences Precinct or are in long-term storage. Attached below is a table of the Library's catalogue of documents related to the Bradfield Scheme, as at November 2015. All of these documents are available to the public on request, with details of how to access them available here - <http://qldgov.softlinkhosting.com.au/liberty/libraryHome.do>.

Recent Consideration

The Queensland Government regularly receives suggestions, proposals and general correspondence suggesting that the Bradfield Scheme or a similar arrangement will 'drought proof' inland areas of the State, open up vast areas of land for irrigation or revitalise the Murray Darling Basin and would have various other benefits.

As well as investigations undertaken in the 1940s and the occasional ad hoc reviews of Bradfield Scheme style proposals that have occurred since, a number of reports were prepared in the early 1980s for the Coordinator General. A selection of these reports are listed in the attached table.

During the Millennium Drought the Beattie government commissioned consultants to investigate the option of piping water from Burdekin Falls Dam, inland of Townsville, to SEQ in order to provide a drought supply option (<http://statements.qld.gov.au/Statement/Id/51970>). Consideration was given to sizing the scheme such that it would be able to meet various percentages of SEQ's water demand. Although this investigation was not of the usual Bradfield Scheme proposal, it did seek to quantify the volume of water required, as well as identify some key technical considerations and the costs of the scheme.

Consultants GHD prepared the report which was completed in October 2007 – http://levilentz.com/work/Classes/555/Refs_project_1/burdekin_seq_pipeline.pdf.

The volumes of water considered by GHD in its report ranged between 188 and 727 megalitres per day (68,000 to 265,000 megalitres per year). This is relatively small by comparison to most Bradfield Scheme proposals which often seek to transfer 1,000,000 megalitres per year or more.

In this case, the technical issues presented by the long and rather convoluted route could be overcome with the application of sufficient money. Because the route was entirely piped, water losses would be minimised, further improving the viability of the scheme from a technical point of view.

GHD calculated costs for water delivered to SEQ, across the range of pipeline capacities, to be between \$5,000 and \$10,000 per megalitre if the scheme was in use permanently. However, these costs would rise as high as \$255,000 to \$480,000 per megalitre if the scheme was only used once in 50 years on average as a drought response measure only. Treatment of the water would add a further \$150 to \$200 per megalitre to these costs. Construction costs in 2007 ranged from \$7,000 million to \$14,000 million. The size of water supply costs that could be paid by agricultural businesses would not approach even a fraction of the costs estimated by GHD.

Even for supply to a large urban centre with a high capacity to pay, the lower range costs would be in excess of alternative supply options such as desalination (estimated at around \$2,500 to \$3,500 per megalitre for 'ready to supply' water). As such, the economics of the proposal were not attractive.

Ultimately, the Bligh government decided not to progress the scheme any further on cost grounds alone - www.brisbanetimes.com.au/news/queensland/at-14-billion-bligh-says-no-thanks-to-burdekin-pipeline/2008/04/28/1209234712396.html.

In 2018, Townsville Enterprise Limited undertook a feasibility study of the proposed Hells Gates Dam in the upper Burdekin River catchment and an associated irrigation scheme. The Hells Gates Dam is often identified as one of the critical storages that would supply water into a Bradfield Scheme type proposal. The study was funded by the Australian Government's National Water Infrastructure Development Fund and the final report documents can be found on the Queensland Government's library here - <http://tinyurl.com/y7wob26p>.

Construction of a dam and irrigation scheme for approximately 50,000 hectares was given a preliminary estimated cost in excess of \$5 billion. That figure is considered likely to increase if detailed dam design work and a wide range of outstanding technical and environmental matters were to be addressed and costed. Furthermore, construction of such a large storage upstream of existing infrastructure in the catchment, including Burdekin Falls Dam, would potentially impact on the capability of that existing infrastructure to supply its own customers.

Whilst the GHD and Townsville Enterprise Limited investigations do not consider all of the elements of a traditional Bradfield Scheme proposal, they do give an indication of some of the costs involved with constructing and operating a scheme of this nature. The storage and pipeline considered in these assessments would be just a small part of a Bradfield Scheme proposal capable of providing reliable water supply to very large areas and, as such, costs for larger and more elaborate schemes would grow commensurately.

On a related note, in 2010, the Australian Government prepared a report that discusses the nature of proposals for large scale water transport and the challenges that they face. This report presents a summary of a variety of long distance water transport proposals from across Australia, the challenges that they can face and the practicality of constructing and operating them. The report can be found online here: <http://pandora.nla.gov.au/pan/123443/20101108-1110/www.environment.gov.au/water/publications/action/pubs/moving-water.pdf>.

Current standard response

At present, the standard response to suggestions for Bradfield Scheme type proposals concentrates on the following key points:

- The availability of water allowing for compliance with Water Resource Plan flow objectives
- Variability of water availability across North Queensland year to year
- Losses of water due to seepage and evaporation in what is an arid area much of the time
- Need for large storage/s to maintain water availability during dry years
- Technical considerations due to pumping requirements including the availability of power
- Issues and costs for using onsite renewable energy generation to power pumps
- Construction issues for channels, pipelines and storages including locating suitable sites
- Remoteness of much of the area presenting challenges during construction and operation
- Environmental impacts on flora and fauna due to changing flow regimes of watercourses
- Impacts on groundwater recharge if water is redirected away from aquifer recharge areas
- Variability in the demand for water, especially during wet years
- Availability of alternative water sources which have lower costs, in particular groundwater
- Ability and willingness of potential users to pay for water
- Impacts on the existing Burdekin Falls Dam located downstream of the proposed Hells Gates Dam

The summary response for proposals includes:

- Further investigations are needed to more accurately quantify the volumes of water that would be available to such a scheme, in general, though the large volumes of water

suggested for extraction from North Queensland's rivers would not be available at all or at least in all years

- A range of technical (including engineering) and environmental issues would need to be addressed, in particular noting that droughts and floods are a natural feature of inland watercourses and disrupting that would have consequences for flora and fauna
- The demand for water across inland Queensland and the downstream southern states, especially considering the likely very high costs of the water, is unknown and would be expected to be highly variable from year to year
- The costs of constructing and operating such a scheme would result in water being too expensive for nearly all users, in particular agricultural businesses which are the usually quoted beneficiaries of such proposals

Released under RTI - DRG

Library Catalogue Search Result

Selected Bibliography

Results 1-14 of 14

TITLE	AUTHOR	COPY CLASSIFICATION	STATUS
Bradfield scheme		333.91 BRA	Available
The Bradfield scheme: comments	Nimmo, W. H. R Bradfield, J. J. C	333.91 BRA 1947	Available
The Bradfield concept, preliminary study: a report prepared for the Co-ordinator-General	Bradfield, J. J. C	333.91 BRA 1982	Available
Report on the hydrology of the Bradfield Scheme	Amprimo, John Felix Henry, K.T		
The Bradfield concept, preliminary study: executive summary of a report prepared for the Co-ordinator-General	Bradfield, J. J. C	333.91 BRA 1982	Available
The Bradfield Concept: further investigations 1983-84: a report prepared for the Co-ordinator General.		333.91 CAM 1984	Available
The Bradfield Concept: further investigations 1983-84: draft: a report prepared for the Co-ordinator General.		333.91 CAM 1984	Available
The revised Bradfield scheme: the proposed diversion of the upper Tully, Herbert, Burdekin Rivers on to the inland plains of north and central Queensland: proposal of Queensland N.P.A. Water Resources Sub-Committee	Heidecker, Eric Stainkey, Roy Bradfield, J. J. C Katter, Bob	333.91 BRA 1981	Available
The Bradfield concept: further investigations 1983-1984 Inception report.		628.1109943 BRA 1984	Available
The Bradfield concept: further investigations 1983-1984 proposal for consultant services.		628.1109943 BRA 1983	Available
Review of long-term prospects for development of mineral resources in the western sector of the Bradfield Scheme.	Hofmann, Gerhard W	REC	Available

TITLE	AUTHOR	COPY CLASSIFICATION	STATUS
Bradfield scheme for "watering the inland": meteorological aspects; (a) possibilities of climatic amelioration and (b) rainfall characteristics of river basins proposed to be harnessed		627.5209943 BRA 1945	Available
Watering inland Australia	Bradfield, J. J. C	628.1109943 BRA 1941	Available
Queensland: the conservation and utilisation of her water resources	Bradfield, J. J. C	333.91 BRA 1938	Available

http://qldgov.softlinkhosting.com.au/liberty/opac/search.do?mode=ADVANCED&action=search&queryTerm=bradfield&includeNonPhysicalItems=true&operator=AND&_open=1

CTS No.	05892/19
DATE REQUESTED	5 March 2019
DATE OF RESPONSE	6 March 2019
ISSUE	The Bradfield Scheme and similar proposals
PREPARED BY	Name: Paul Hope Position: Principal Advisor Business Unit: Regional Water Supply Infrastructure Phone Number: 3166 0164
FINAL APPROVAL	Name: Linda Dobe Position: DDG Business Unit: Water Markets and Supply Phone Number: 3166 0132

KEY ISSUES

- In early February 2019 the Honourable Barnaby Joyce MP was quoted (Peta Credlin, Sky News)

as calling for assessment of the Bradfield Scheme to address drought related matters in rural Australia.

- On 24 February 2019, John Barilaro MP (NSW Deputy Premier) is noted on his Twitter account (again via Sky News) as committing \$25 Million for assessment of the Bradfield Scheme.
- On 5 March 2019 the Courier Mail printed an article quoting details of a proposal from Sir Leo Hielscher and Sir Frank Moore to assess the Bradfield Scheme with a view to progressing the idea towards construction.
- Costs for construction and operation of a Bradfield type scheme would be huge:
 - Hells Gates Dam - ~\$5 billion plus estimated in NWIDF feasibility study to irrigate up to 50,000 hectares
 - Pipeline from Burdekin Falls Dam to SEQ – between \$7 billion and \$14 billion in 2007 (for small scale supply relative to Bradfield Scheme sizing)
- Significant additional dams, weirs, pipelines, channels, pumps, power required over and above these two examples if you were to construct a Bradfield Scheme
- Energy requirements for pumping would be very high (gravity flow rates are low – consider how long it takes floodwaters to cross the Channel Country)
- Final cost for water would be huge
- Water availability from rainfall highly variable in volume and location across NQ from one year to the next
- Demand for water (even if you ignore the cost) would be highly variable depending on natural rainfall
- Rainfall across NQ represents a significant element of recharge for the Great Artesian Basin
- Freshwater flows in watercourses across NQ are required for flora and fauna lifecycles, including significant shellfish and fisheries (Barramundi) industries

BACKGROUND

- The general concept of the Bradfield Scheme was suggested by Dr John Bradfield in 1938.
- Although there were slight variations to the proposal, the general premise was to capture and divert water from a number of rivers across northern Queensland, transferring it to inland/southward flowing rivers to enable irrigation of vast areas of land.
- Even at the time, Dr Bradfield's proposal was considered to be technically unfeasible and uneconomic.
- A number of assessments of the proposal, or at least elements of the general proposal, have taken place since that time, all of which have identified significant technical and environmental challenges as well as the extremely high cost of constructing and operating such a scheme.
- A document outlining the Bradfield Scheme proposal and its longer and more recent history of assessments is included in MECS – Attachment 1.
- Also included is a report prepared by the Australian Government in 2010 which considers the general concept of long distance water transfers and the many technical, environmental and economic challenges such proposals face – Attachment 2.

NEXT STEPS

- The Department of Natural Resources Mines and Energy has also developed a generic response for replying to correspondence relating to Bradfield Scheme type matters – Attachment 3.
-

ATTACHMENTS

1. The Bradfield Scheme and similar proposals – document outlining the general concept and history of assessment in Queensland
2. Moving Water Long Distances: Grand schemes or pipe dreams – a 2010 Australian Government report

3. Generic response to Bradfield Scheme correspondence for the Department of Natural Resources Mines and Energy

Released under RTI - DPC

Rebecca McGarrity

From: Elizabeth Fellows
Sent: Wednesday, 30 October 2019 4:26 PM
To: Rebecca McGarrity
Subject: FW: Diverting flood waters, Bradfield plan, proposed update
Attachments: Article about Bradfield Scheme update by Hielscher adn Moore - Courier Mail 05.03.2019.pdf

Dr Elizabeth Fellows

Director | Environment Policy | DPC
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From: Justin Carpenter <justin.carpenter@premiers.qld.gov.au>
Sent: Thursday, 7 March 2019 1:04 PM
To: Julia Sheedy <julia.sheedy@premiers.qld.gov.au>
Cc: Lauren Pearce <Lauren.Pearce@premiers.qld.gov.au>; Mark Cridland <mark.cridland@premiers.qld.gov.au>; Roisin McCartney <roisin.mccartney@premiers.qld.gov.au>
Subject: Diverting flood waters, Bradfield plan, proposed update

Hi Julia,

I understand you were chasing some points on the Bradfield scheme (or similar), and info on feasibility and recent consideration. Hope this helps.

Bradfield Scheme - background

- In 1938 Dr John Bradfield proposed a scheme whereby water would be extracted from one or more of the Tully, Herbert or Burdekin rivers, pumped over the Great Dividing Range and then distributed through a system of rivers, channels, pipelines and storages to water users across western areas of Queensland and other States.
- Dr Bradfield's proposal was determined to be technically unfeasible and uneconomic at the time (and subsequently).
- Critical challenges for the proposal (as well as other similarly large-scale flood diversion and water supply programs in the region) relate to:
 - (1) uncertain and variable water availability (particularly in arid areas, and with the potential to take away from other water users or the environment, in developed catchments);
 - (2) large water losses (evaporation, seepage) – affecting reliability and with environmental impacts; and
 - (3) significant construction and operation costs (with no prospect of economic return).
- Queensland Bulk Water Opportunities Statement (<https://www.dnrme.qld.gov.au/land-water/initiatives/bulk-water-statement>) has a page dedicated to the Bradfield Scheme (see page 51) that summarises the challenges associated with these schemes.
- There is no recent formal proposal that can be reviewed (re: Courier Mail Article, attached) but DNRME will, should one emerge.

Recent Consideration of the scheme

- The Queensland Government regularly receives suggestions, proposals and general correspondence suggesting that the Bradfield Scheme or a similar arrangement will drought proof inland areas of the State, mitigate floods, open up vast areas of land for irrigation or revitalise the Murray Darling Basin and would have various other benefits.

- As well as investigations undertaken in the 1940s and the occasional ad hoc reviews of Bradfield Scheme style proposals that have occurred since, a number of reports were prepared in the early 1980s for the Coordinator General.
- In 2007 - During the Millennium Drought the Beattie government commissioned consultants to investigate the option of piping water from Burdekin Falls Dam, inland of Townsville, to SEQ in order to provide a drought supply option. Consideration was given to sizing the scheme such that it would be able to meet various percentages of SEQ's water demand.
- In 2018, Townsville Enterprise Limited undertook a feasibility study of the proposed Hells Gates Dam in the upper Burdekin River catchment and an associated irrigation scheme. The Hells Gates Dam is often identified as one of the critical storages that would supply water into a Bradfield Scheme type proposal.
- In all cases, it was decided to not progress based on costs involved with constructing and operating a scheme of this nature. The storage and pipeline considered in these assessments would be just a small part of a Bradfield Scheme proposal capable of providing reliable water supply to very large areas and, as such, costs for larger and more elaborate schemes would grow commensurately.
- In 2010, the Australian Government also prepared a report that discusses the nature of proposals for large scale water transport and the challenges that they face. This report presents a summary of a variety of long distance water transport proposals from across Australia, the challenges that they can face and the practicality of constructing and operating them.



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Sharlene Larsen

Subject: Meeting: Dave Stewart and Rebecca McGarrity - Bradfield Scheme
Location: Director-General's Office - level 40, 1 William Street, Brisbane City

Start: Wed 30/10/2019 4:30 PM
End: Wed 30/10/2019 5:00 PM
Show Time As: Tentative

Recurrence: (none)

Meeting Status: Not yet responded

Organizer: Dave Stewart
Required Attendees: Rebecca McGarrity

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Rebecca McGarrity

From: Elizabeth Fellows
Sent: Wednesday, 30 October 2019 4:42 PM
To: Rebecca McGarrity
Cc: Rob Lloyd-Jones; Adrian Jeffreys
Subject: GHD report - bradfield costs

http://levilentz.com/work/Classes/555/Refs_project_1/burdekin_seq_pipeline.pdf

- Capital cost \$13.9 billion by 2056 for 727 megalitres per day. Less for smaller projects.
- Water cost dependent on how it is operated – continuous operation \$5500 per megalitre, increasing to \$256,000 per megalitre for emergency 1 in 50 year operation.



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*I acknowledge Aboriginal and Torres Strait Islander peoples
as the Traditional Owners and Custodians of this Country
and recognise their connection to land, sea and community.*

*I pay my respect to them, their cultures, and to their Elders,
past, present and emerging.*

Rebecca McGarrity

From: Adrian Jeffreys
Sent: Wednesday, 30 October 2019 5:27 PM
To: Dave Stewart
Cc: Rebecca McGarrity
Subject: Bradfield Scheme
Attachments: burdekin_seq_pipeline.pdf

Dave,
Linda Dobe mentioned you were after the attached report.

There are other reports of varying quality:

- A 1982 report commissioned by the then CG from Townville-based engineering company McNamara (DNRME has a hard copy)
- Very preliminary work done in 2007 looking at moving water to the Murray Darling Basin (not recently seen – have to find it in the archives)
- Parallel work done by the Commonwealth on the same subject that was never released.
- All the detailed work done to develop the SEQ water grid including exploration of options which concluded that desal was overwhelmingly the cheapest solution.



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Rebecca McGarrity

From: Rebecca McGarrity
Sent: Thursday, 31 October 2019 1:11 PM
To: Dave Stewart
Cc: Adrian Jeffreys; Rob Lloyd-Jones
Subject: Prem Pol Mtg - Bradfield Scheme.pptx
Attachments: Prem Pol Mtg - Bradfield Scheme.pptx

Hi Dave

Here is a DRAFT deck re the Bradfield scheme prepared by ERP.

We also have maps.



Rebecca McGarrity PSM

A/ Deputy Director-General

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Background: 1938 Bradfield scheme

- Dams on Tully, Herbert and Burdekin Rivers (Hells Gates) with water diverted west into Lake Eyre Basin rivers
- Subsequent studies, including 1982 McNamara Report commissioned by Bjelke Petersen Government, identified major problems
- Bradfield proposed using gravity to move water – not possible
- Extremely expensive to build and operate
- Major environmental problems (dams in Wet Tropics World Heritage area, GBR issues, salinity in western soils)

Background: 2007 Burdekin to Wivenhoe Scheme

- Option considered to augment SEQ water supply during Millennium Drought
- 1000km and up to 8 pumping stations
- Construction: \$7b – \$14b in 2007 dollars (\$9- \$18b in 2019)
- Operating cost: \$5,000 - \$10,000/ML if in continuous use; \$255,000 - \$480,000/ML if used as emergency measure
- Other options significantly cheaper, (e.g desalination \$2,500 - \$3,500/ML)

Long distance water infrastructure schemes can work

- South East Queensland Water Grid:
 - ~ \$6.9 billion, including:
 - Northern Pipeline Interconnector (95km Sunshine Coast to Brisbane) ~ \$867 million
 - Southern Regional Water Pipeline (120km Gold Coast to Brisbane) ~ \$858 million
 - Eastern Pipeline Interconnector ~ \$41 million
 - Wivenhoe Dam to Cressbrook Dam (38km Brisbane to Toowoomba) ~ \$187 million
 - Ernest Henry Mine to Cloncurry (38km) ~ \$42.5 million
 - Haughton Duplication Pipeline (36.5km) ~ \$195 million
- Sunwater:
 - 11 other bulk water pipelines (2100km)

Assessing Future Options

- Long distance water transfer generally only viable for customers willing to pay the price (e.g. industry, mines, urban communities)
- Other options (e.g. water efficiency measures, new dams, desalination) usually much cheaper
- Queensland Bulk Water Opportunities Statement (updated annually) sets out principles and projects

Possible Southern Downs pipeline

- Unless there is significant rainfall in the next 12- 24 months, Warwick is at severe risk of running out of water
- Water carting is not feasible (population too large) and new groundwater sources unlikely to be sustainable
- Urgent work needed to find solutions
- One option is a pipeline connection to Toowoomba
- This would be an extension of the SEQ water grid