

RAILROADED:

Carving up food lands for coal transport
in Central Queensland.



by Hydrocology Environmental Consulting March 2014



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Executive Summary

This report examines one cluster of large-scale rail projects in Central Queensland, proposed to facilitate the shipment of coal from mining in the Galilee Basin, and the damage it threatens to inflict on land and water across productive agricultural landscapes and floodplains.

There are five rail lines currently proposed to export coal from the region which encompass over 1400 km of new and upgraded rail infrastructure and directly affect over 120 landholdings. They have the potential to interact and produce significant cumulative impacts, particularly in respect to elevated flood impacts, loss of agricultural productivity and fragmentation of agricultural land.

Whilst it has been suggested that only one or two rail lines may eventually be built, two have already been approved and two more are currently seeking an approval. Therefore, the ultimate configuration and the resultant impacts are still extremely uncertain, and that uncertainty itself is causing disruption and stress for landholders and communities.

The Qld Government has developed a plan to facilitate and promote railway development for coal mining in the region - the Galilee Basin State Development Area (GBSDA).

The SDA is part of a broader Galilee Basin Development Strategy, which proposes a range of measures including discounted water licences and discounted royalty payments for mine proponents, and the provision of water to coal miners from the State reserve.

Galilee Basin State Development Area (GBSDA)

The proposed State Development Area will give the Queensland Coordinator-General the power to compulsorily acquire any land for railway development across an area greater than 2 million hectares in size.

Central Queensland currently produces 9.5% of Queensland's agricultural production and contains a number of the State's largest floodplains. The proposed GBSDA includes some of the State's most productive agricultural land.

Under the terms of the State Development Area scheme the Coordinator-General will not support land uses anywhere in the 2M hectare area that are not consistent with rail infrastructure, and landholders may have to apply for permission to continue using the land as they are currently doing.

Although cropping and animal husbandry are listed by the scheme as activities that "may be consistent," with the railways, farmers may have to pay a fee to apply to continue farming. The Coordinator General has the power to refuse the application with no right of appeal.

Above and beyond this concern, is the abiding risk that farmers will be forced into compulsory acquisition and land will be forcibly removed from them by the Government with no requirement for good faith negotiation.

The weight of uncertainty alone for these landowners within the GBSDA is enough to drive down land prices and chill beneficial agricultural productivity, let alone expansion. A similar SDA scheme for a coal rail line in the Surat Basin resulted in a reported 30% loss in land values.



GBSDA Precincts

There are three precincts proposed within the GBSDA, which map out the areas or corridors most likely to be directly impacted by rail infrastructure. There is a precinct for Mining Services, a West to East Rail Corridor and a South to North Rail Corridor.

The precincts intersect 933 different land parcels, and thus represent a major source of uncertainty to a large number of landholders. The precincts cover almost 200,000 hectares of pasture and over 50,000 hectares of potential cropping and horticultural land. They also include over 11,000 hectares of the Bowen Important Agricultural Area.

That means that large areas of vital food-producing land are likely to be directly alienated or fragmented, as a result of the GBSDA, with subsequent impacts on food production targets for Queensland.

The Queensland Government has set an ambitious target to double food production by 2040. However, this commitment is unlikely to ever be met if agricultural land is lost and fragmented due to coal mines and associated rail infrastructure.

Flood Risks and Implications

There are very substantial flood risks associated with the GBSDA, because the construction of large, elevated rail infrastructure across major floodplains and waterways will substantially change surface water flows and lead to altered flood patterns.

The region is highly flood prone. Since 1906, there have been 57 tropical cyclones that have passed within 200 km of the GBSDA and over 500,000 hectares of the GBSDA regularly experiences flooding. The proposed GBSDA precincts cut across 1,680 waterways between the Galilee Basin and Abbot Point.

The extent of the floodplain likely to be traversed by rail lines, the density of the drainage and the cyclone frequency in the region, all point to very high flood risks. Therefore, planning for the rail lines should have prioritised precautionary flood avoidance and flood mitigation.

However, none of the rail projects proposed for the GBSDA comply with Queensland State Planning Policy 1/03 'Mitigating the Adverse Impacts of Flood, Bushfire and Landslide' or the most recent Australian Rainfall and Runoff Revision for Blockage of Hydraulic Structures by Engineers Australia.

Instead, proponents have been allowed to minimise costs by proposing to build structures that are only designed for 1 in 20 year or 1 in 50 year flood events, instead of the larger floods that represent the greatest risks.

In fact, the drainage structures that have been approved for one rail proposal are so poorly designed that they are rated as having an 84% chance of failure over their life. Such negligent cost avoidance puts at risk the communities of the region, its infrastructure and agricultural productivity.



The Regional Planning Interests Act

The new Queensland Regional Planning Interests Act, which was passed recently, weakens the previous protections provided for agricultural land via the Strategic Cropping Land Act, which is set to be repealed. The Regional Planning Interests Act 2014 does not place any prohibitions on mining in agricultural areas and it does not require an Agricultural Impact Assessment prior to granting Regional Planning Interest Authorities.

Despite the GBSDA precincts taking in over 50,000 ha of potential cropping land, the out-dated regional plan that covers the GBSDA area does not identify any 'Priority Agricultural Areas'. Therefore, even the weak measures that apply in the RPI Act for such areas do not apply in this instance.

Conclusion

The new rail projects proposed for the GBSDA will reduce the area of available high quality farmland in Central Queensland, fragment the agricultural landscape in the region and create significant additional flood impacts for the local communities and agricultural industries. As a result, the contribution to the State's agricultural production is predicted to decline.

The continued imbalance in the Government's policy approach, which privileges damaging mining activity and its infrastructure needs over other, long-established land uses in rural Central Queensland is leading to the irreversible loss of good quality land, and jeopardising the food producing future of the state.

Without clear and unambiguous statutory protection, agricultural lands and critical water resources that underpin them will continue to be lost to coal mining and its associated infrastructure and the chronic decline of agricultural productivity in Queensland will continue.



Image Page 8: Cattle © 2014 Erland Howden;
Image Page 9: Paula Heelan

1. Introduction

Agricultural production contributes an estimated \$14.7 billion a year to the Queensland economy.¹ Queensland has the largest area of agricultural land of any Australian state and the highest proportion of land area dedicated to agriculture with about 79%.² Queensland agriculture comprises about 30,500 businesses³ that employ 62,700 people⁴ and it is one of the “four pillars” of the Queensland economy.

In spite of increasing global demand for food, and what an Executive Board member of Rabobank, Berry Martin, has warned may be the coming “global food crisis,”⁵ the Queensland agricultural sector is in decline. Deteriorating terms of trade, increasing mechanisation of farming systems and growing demand for non-agricultural land use are putting Queensland farmers under significant pressure.⁶ Today, one of the greatest barriers to a sustainable and growing Queensland agricultural industry is competition from the mining sector for land, water and labour.

Over the past five years, Queensland agricultural holdings have decreased by three per cent.⁷ Over the same period, 120 Mining Lease applications have been lodged covering an area of about 600,000 ha, a fourfold increase in area compared to the previous five years.⁸ However, it is not just the coal mines themselves have the potential to compromise Queensland’s agricultural productivity, it is transport infrastructure required to move the coal to export terminals. This report examines one cluster of large-scale rail projects in Central Queensland, proposed to facilitate the shipment of coal from mining in the Galilee Basin, and the damage it threatens to inflict on land and water across productive agricultural floodplains.

Prior to winning Government, Campbell Newman wrote to the Lock the Gate Alliance promising to protect strategic cropping land from development “if it is likely to have a significant, adverse impact on the productive capacity of that land to produce food and fibre in the future.”^{9 10} But, rather than increasing protection for agricultural land in Queensland, the Newman Government has instead reduced it, most recently with the passing of the Regional Planning Interests Act 2014.

On 7 November 2013, the Queensland Premier announced the Galilee Basin Development Strategy and a proposal to declare the Galilee Basin State Development Area (GBSDA) within which the Coordinator-General may compulsorily acquire any land.¹¹ The GBSDA extends over 2 million hectares and some of the State’s most productive agricultural land, containing almost 400,000 ha of Class A and B agricultural land and almost 60,000 hectares of potential Strategic Cropping Land (SCL).

¹ DAFF, 2013.

² ABS, 2013.

³ <http://www.business.qld.gov.au/industry/agriculture/agriculture>

⁴ DEEWR, 2013.

⁵ “ABARE, 2014.

⁶ DAFF, 2013.

⁷ ABS, 2013.

⁸ DNRM, 2013.

⁹ See also public statements in <http://www.theaustralian.com.au/national-affairs/campbell-newman-slams-farm-gate-shut-on-miners/story-fnbsqt8f-1226312958263#>; and <http://www.warwickdailynews.com.au/news/talking-regional-campbell-newman/1459874/>

¹⁰ http://ruralpressclub.com.au/item.cfm?page_id=189&site_id=0

¹¹ In accordance with section 82 of the State Development Public Works Organisation Act

Map 1: Location of Galilee Basin State Development Area



There are five rail lines proposed for the GBSDA totalling over 1400 km of new and upgraded rail infrastructure that have the potential to interact and produce significant cumulative impacts, particularly in respect to elevated flood impacts, loss of agricultural productivity and fragmentation of agricultural land.

While one company involved in the area, Adani, states in an EIS that, "It is likely that only one of these rail lines will proceed,"¹² the Alpha Coal Project (Rail) and Waratah Coal Pty Ltd's Galilee Coal Northern Export Facility (Rail) have already been approved by the Queensland Coordinator General and the Federal Environmental Minister, and Adani themselves are seeking Government approval for two more rail lines. Adani's Carmichael Rail Project is awaiting approval and their North Galilee Basin Rail Project has recently exhibited its EIS. The fifth line is proposed by Aurizon, formerly QR National, who is yet to lodge an EIS for its Central Queensland Integrated Rail Project.¹³

This report questions the need for the GBSDA and its planned rail links and analyses, assesses and quantifies the potential loss of agricultural land and the impacts that the potential increased flooding that these rail proposals have for the Mackay, Isaac and Whitsunday Region.

¹² Carmichael Coal Mine and Rail Project 8-25

¹³ <http://www.dsdip.qld.gov.au/assessments-and-approvals/> Accessed 26 February 2014

2. Policy context: Queensland agricultural land conservation

2.1 Good Quality Agricultural Land

In 2013, the Queensland Government released the Queensland Agricultural Land Audit in furtherance of the Government's goal of doubling agriculture, fisheries and forestry production by 2040, including a commitment to double food production.¹⁴ The audit was to help guide investment in the agricultural sector and inform decision-making to ensure the best use of Queensland's agricultural land. The stated primary pathway to succeed in doubling food production by 2040 is resource availability, particularly land, water and labour, which is under increasing pressure from an expanding resources sector.¹⁵

Since 1992 in Queensland, the conservation of Good Quality Agricultural Land¹⁶ has been a consideration in planning approvals.¹⁷ Good Quality Agricultural Land (GQAL) is land which is capable of sustainable use for agriculture, with a reasonable level of inputs, and without causing degradation of land or other natural resources. In this context, agricultural land is defined as land used for crop or animal production, but excluding intensive animal uses such as feedlots, piggeries, poultry farms and plant nurseries based on either hydroponics or imported growth media.¹⁸ GQAL is assessed based on agricultural land classification. Class A land is considered to be GQAL in all parts of the State. In areas where agricultural land is scarce, Class B land is also considered GQAL, and better-quality Class C is considered to be GQAL in areas where pastoral industries predominate.¹⁹ GQAL is based on local government areas and is subject to variation.²⁰

Table 1: Agricultural land classes

| Class | Description |
|-----------------------------|--|
| Class A - Crop land | Land that is suitable for current and potential crops with limitations to production which range from none to moderate levels. |
| Class B - Limited crop land | Land that is marginal for current and potential crops due to severe limitations; and suitable for pastures. Engineering and/or agronomic improvements may be required before the land is considered suitable for cropping. |
| Class C - Pasture land | Land that is suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production; but some areas may tolerate a short period of ground disturbance for pasture establishment. |

Source: DPI and DHLGP, 1993

Map 2 identifies the GQAL within the Mackay, Isaac and Whitsunday Region, as well as the GBSDA that threatens some of it.

¹⁴ DAFF, 2013.

¹⁵ Queensland Agricultural Land Audit. p9

¹⁶ Good quality agricultural land is defined as land that is capable of sustainable use for agriculture, with a reasonable level of inputs, and without causing degradation of land or other natural resources.

¹⁷ State of Queensland, 1992.

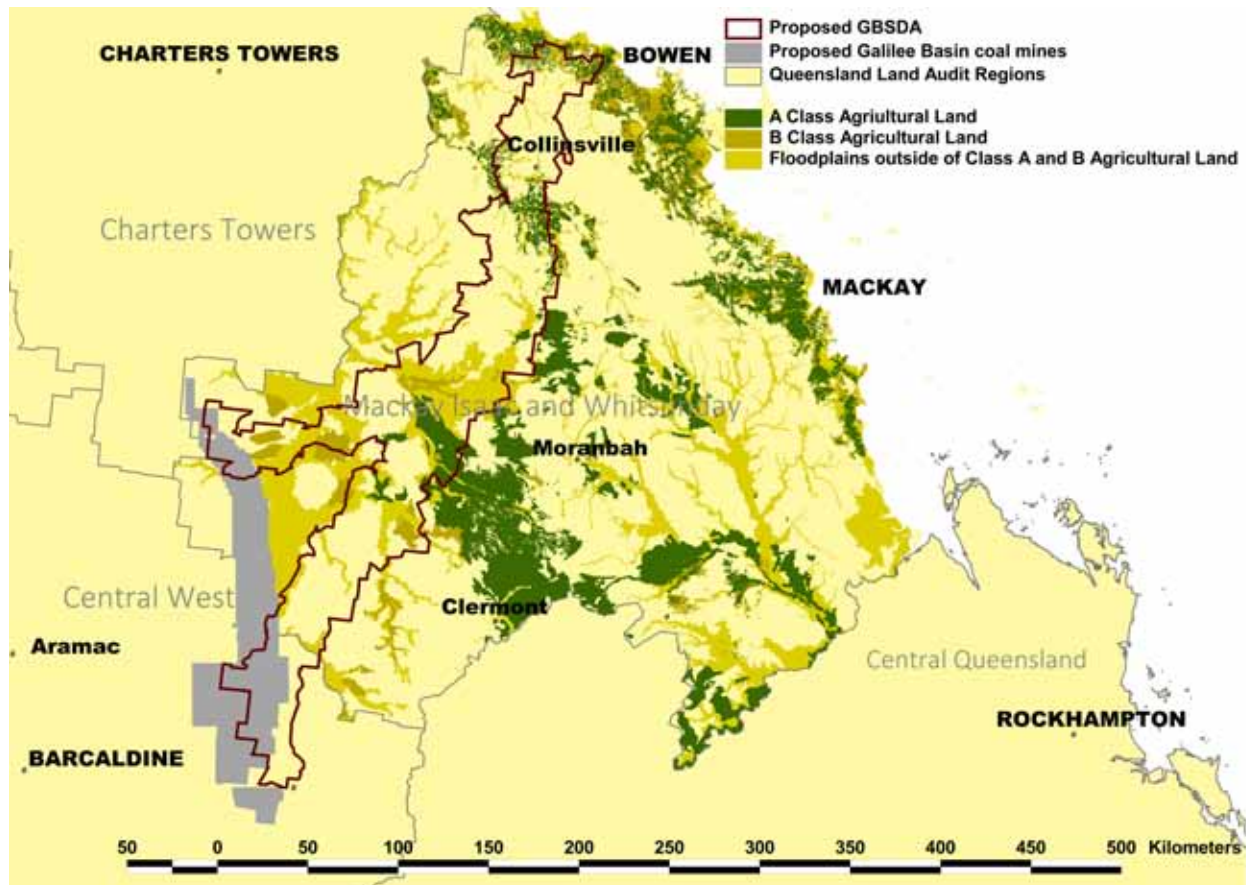
¹⁸ DPI and DLGP, 1993.

¹⁹ <http://www.qld.gov.au/environment/land/soil/soil-data/land-evaluation/>

²⁰ DPI and DLGP, 1993.

State Planning Policy 1/92: Development and the Conservation of Agricultural Land requires Queensland decision-makers to be aware of the location and extent of GQAL. Such information is necessary so that provisions for the protection of this land can be included in strategic plans, development control plans (DCPs) and other elements of planning schemes.²¹

Map 2: Good Quality Agricultural Land within the Mackay, Isaac and Whitsunday Region



2.2 Strategic Cropping Land

The Queensland Government acknowledges that the best cropping land, defined as Strategic Cropping Land, is a finite resource that must be conserved and managed for the longer term. The purpose of defining such land is to allow for planning and approval powers to be used to protect it from developments that would lead to its permanent alienation or diminished productivity.

The introduction of the Strategic Cropping Land Act 2011 and subsequent State Planning Policy SPP1/12 Protection of Queensland's strategic cropping land narrowed the scope and definition of the conservation of agricultural land to focus on just that which has a history of cropping in specific coastal regions. It also created a hierarchy of cropping land: land that lies within two mapped "Protection Areas" is treated differently from land in "Management Areas."

²¹ *ibid*

The Strategic Cropping Land Act 2011 commenced on 30 January 2012 with objectives to:

- protect land that is highly suitable for cropping
- manage the impacts of development on that land
- preserve the productive capacity of that land for future generations.

The Act is supposed to achieve these objectives by:

- identifying potential SCL
- providing criteria to decide whether or not land is SCL
- establishing the protection and management areas
- creating a process to assess development
- allowing for conditions to be imposed on development
- preventing permanent impacts on SCL in protection areas (unless the development is in exceptional circumstances); and
- requiring mitigation to be paid by developers if SCL is permanently impacted in the management area, or by a development in exceptional circumstances.

The SCL “trigger map,” which indicates potential SCL, was prepared using Class A agricultural land and Versatile Cropping Land data and 1999 Queensland Land Use Mapping Program (QLUMP) data with non-agricultural areas removed.

To be validated as Strategic Cropping Land, the lands must pass two tests: a history of cropping (HoC) test and field criteria. A cropping history assessment requires at least three cropping events to have occurred on the property from 1 January 1999 to 31 December 2010. The entire property is assessed even if only a portion of the property is mapped as SCL. If the SCL area fails this HoC test, the site does not qualify as SCL and field validation assessment is not required. If the area passes the HoC test, it then has to pass the zonal criteria test, where soil moisture, depth, acidity, slope and rockiness are tested. SCL is divided into five zones (see Table 2) that reflect regional differences in climate, land form and cropping systems. These zones are sub-divided into management areas and protection areas. Over 60 per cent of the GBSDA sits within SCL zones, of which 86 percent is within the largest Western Cropping Zone and a smaller portion in the Coastal Queensland Zone.

The Strategic Cropping Land Act has now been repealed by the passing of the Regional Planning Interests Act 2014, on 20 March 2014.

Table 2: Queensland Strategic Cropping Land zones

| SCL Zones | Total area (Ha) | GBSDA (Ha) | SCL Trigger map in GBSDA (Ha) |
|-----------------------|-----------------|---------------|----------------------------------|
| COASTAL QUEENSLAND | 14,584,185 | 171,077 | 15,547 |
| EASTERN DARLING DOWNS | 1,048,366 | 0 | 0 |
| GRANITE BELT | 181,860 | 0 | 0 |
| WESTERN CROPPING | 31,916,104 | 1,077,201 | 77,825 |
| WET TROPICS | 3,090,667 | 0 | 0 |
| Total | 50,821,182 | 1,248,278 | 93,373 |

Source: DAFF, 2013a

Under the SCL Act, temporary impacts are defined as those that prevent cropping for up to 50 years, at which point the soil resource and landform will be restored to its former SCL status. The impact on the soil resource and landforms needs to be able to be restored to pre-existing condition and soil health. Permanent impacts disturb cropping activities for 50 years or more and may not facilitate restoration of land to its former SCL status. Activities that permanently impact on Strategic Cropping Land are only prohibited in the Protection Areas. Elsewhere, if a mining company is going to permanently remove or damage cropping land, they pay a mitigation fee or enter into a mitigation deed. A mitigation deed may include of a combination of activities to address the loss of the productive capacity and a payment to the mitigation fund.

Mitigation costs for activities that have permanent impacts are calculated based on the Strategic Cropping Land Regulation 2011. The Galilee Basin State Development Areas falls within both the Central Highlands Isaac subregion of Western Cropping zone and the Mackay Whitsunday subregion of the Central Queensland Coast Cropping Zones. The prescribed Mitigation fees are \$4,750 per hectare for the Central Highlands Isaac subregion and \$15,000 per hectare for the Mackay Whitsunday subregion.²²

2.3 Regional Planning Interests Act

The Newman Government has now passed the Regional Planning Interests Act 2014²³ which further erodes both the definition and scope of agricultural land conservation in Queensland to include only “Priority Agricultural Areas” which are defined “as an area used for a priority agricultural land use.” The minimal protections in place for cropping land will be lost, as the new Bill repeals the Strategic Cropping Land Act.

Criticism of this new law centres on the replacement of the agricultural land protection mechanisms of the Strategic Cropping Land Act with a system that has as its purpose the “management” of impacts of resource activities, and “co-existence” of resource activities with agricultural activities, and does not anywhere propose protections or prohibitions.²⁴ While the Act preserves strategic cropping land as a “regional interest” (Section 7 (c)), there is nothing in the purposes of the law now which empowers it to protect and preserve matters and areas of regional interest, including priority agricultural areas and strategic cropping land or delineate areas that are off-limits to mining and its associated infrastructure.

The Priority Agricultural Areas, identified in new regional plans, are limited in extent and neither the Regional Plans nor the Regional Planning Interests Act prohibit coal mining and gas extraction in Priority Agricultural Areas, within 2km of residential areas and growth areas, or within critical water resources. The Bill also fails to provide for an agricultural impact assessment before awarding Regional Planning Interest Authorities.

It has been reported that the Regional Plan Priority Agricultural Areas mapped within the Darling Downs represent less than half of the current cropping area and only about 40 per cent of that in Central Queensland. Critics of the Darling Downs Regional Plan claim the priority land uses do not include improved grazing areas, such as dry land cropping or the water infrastructure essential to operating irrigated agriculture.²⁵

The Act will provide coal mining and gas extraction with an easy approval pathway in areas of agricultural production. Without clear and unambiguous statutory protection, agricultural lands and critical water resources that underpin them will continue to be lost to coal mining and its associated infrastructure and the chronic decline of agricultural productivity in Queensland will continue.

For the areas affected by the Galilee Basin State Development Area the situation is even worse: there are no “priority agricultural areas” mapped in the entire region, because the current regional plan pre-dates this latest terminology.²⁶

²² Regulation 10, Strategic Cropping Land Regulation 2011 (Qld)

²³ <https://www.legislation.qld.gov.au/Bills/54PDF/2013/RegionalPlanningB13.pdf> accessed 26 February 2014.

²⁴ The purposes of the new Bill are outlined in Section 3. <https://www.legislation.qld.gov.au/Bills/54PDF/2013/RegionalPlanningB13.pdf>

²⁵ <http://www.abc.net.au/news/2013-10-24/regional-plans-released/5043880>

²⁶ DSIP, 2012.

2.4 State Planning Policy

Until December 2013, when the State Planning Policy²⁷ (SPP) was introduced, Local Government planning assessments for agricultural land were dealt with under State Planning Policy 1/92 (Development and The Conservation of Agricultural Land) Order.²⁸ The new SPP promotes and optimises agricultural development opportunities and enables increased agricultural production in these areas. The SPP protects productive agricultural land and maintains or enhances land condition and the biophysical resources by avoiding fragmentation of Class A or Class B land into lot sizes inconsistent with the current or potential agricultural use, and avoids locating non-agricultural development on or adjacent to such land.

The SPP only, however, applies to Local Government decisions. Unfortunately for Queensland's agricultural productivity, if a project is declared a "coordinated project" by the Coordinator-General under the State Development and Public Works Organisation Act 1971 (SDPWO Act), as many coal mines and all of their associated railways are, the SPP does not apply. For the vast majority of extractive industry and the massive infrastructure schemes that threaten valuable farmland in Queensland, the policy that is supposed to protect productive food land does not apply. Queensland's good, versatile, and productive agricultural land will, therefore, continue to be lost, degraded and fragmented.

3. The Galilee Basin State Development Area

The State Development and Public Works Organisation Act 1971 allows for regulation to declare any part of Queensland to be a State Development Area (SDA)²⁹ within which the Coordinator-General may acquire land for the primary purpose for which the SDA was declared or any incidental purpose.³⁰ If land is compulsorily acquired in an SDA, the owner of the land is compensated in accordance with the process in the Acquisition of Land Act 1967.

On 7 November 2013, the Queensland Premier, Campbell Newman announced the Galilee Basin Development Strategy under which the declaration of a Galilee Basin State Development Area (GBSDA) has been proposed. As shown in Map 2, the GBSDA extends over 20,000 square kilometres and captures some of the State's most productive agricultural land.

There are three precincts proposed for the GBSDA Scheme: a precinct for Mining Services, a West to East Rail corridor and South to North Rail Corridor (see Map 3). For the rail Precincts, land uses inconsistent with future rail infrastructure will not be given approval (GBSDA Scheme 13-14). Cropping and animal husbandry are listed for both rail corridors as uses that "may be" consistent with the preferred land use intent, as long as the current farming and grazing "does not alienate land within the precinct for the identified consistent uses" that is, coal export railways and their associated infrastructure.³¹

The South to North Rail Precinct is to "accommodate future rail infrastructure and associated activities in the Galilee Basin. Once the preferred rail corridor alignment has been identified other rail corridor alignment options will not be supported." The South to North Rail Precinct can accommodate two distinct new rail alignments from the southern end of the Galilee Basin and a third from northern Galilee. Two of these alignments join up south of Collinsville, where one joins the existing rail alignment to Abbot Point and a second proceeds to Abbot Point to the west of the existing line (see Map 3). It would appear that all the current rail alignment proposals can be accommodated within the Precinct, with the exception of the section of GVK Hancock's Alpha alignment north west from Collinsville, where the proposal lies well outside of the GBSDA boundary, but has status as a Priority Infrastructure Facility and so can utilise compulsory acquisition anyway.

²⁷ DSDIP, 2013, p 21

²⁸ <http://www.dsdip.qld.gov.au/codes-policies-and-regulatory-provisions/lapsed-or-repealed-state-planning-policies.html>

²⁹ Section 77

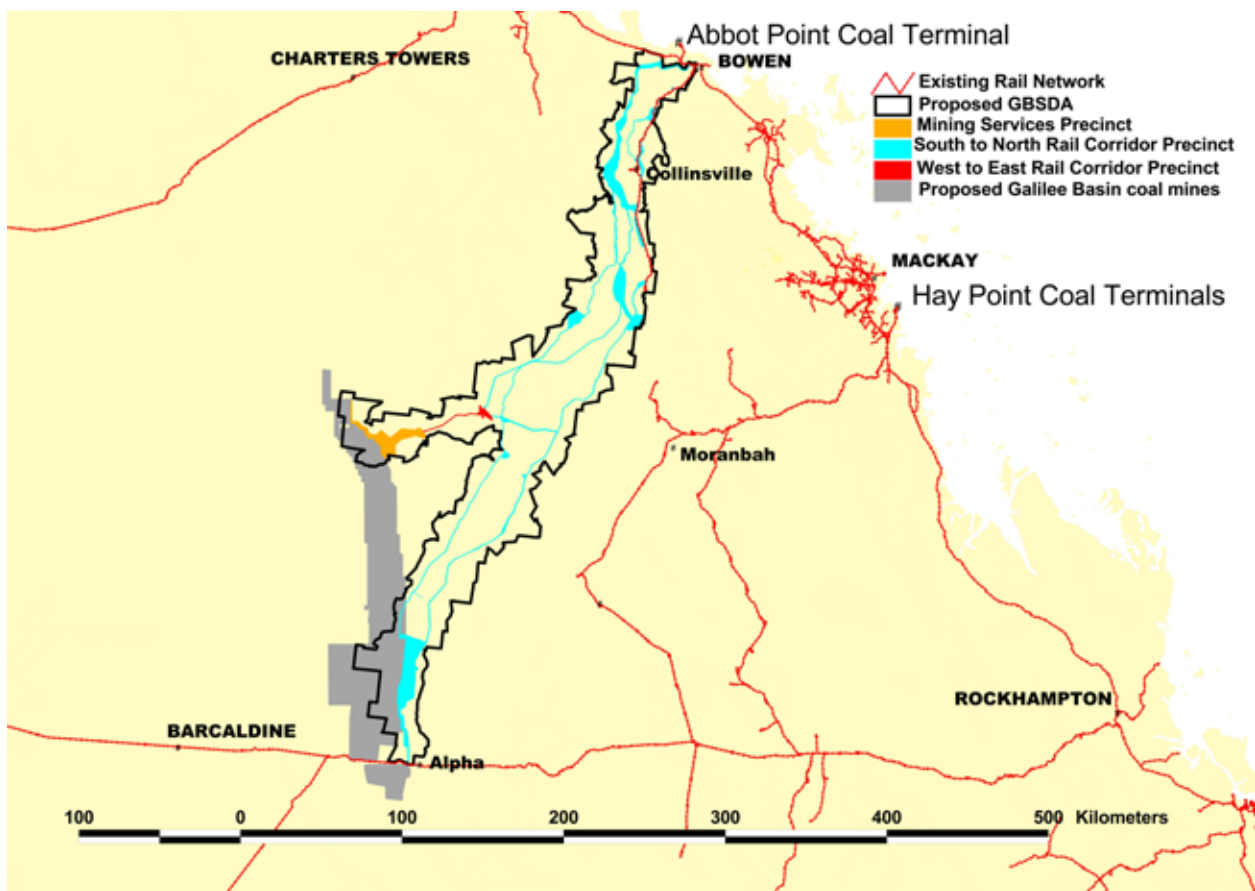
³⁰ Section 82

³¹ QCG, 2014, p14

The Queensland Coordinator General proposes that rail infrastructure within both the West to East and South to North Corridor Precinct “is to minimise impacts on existing infrastructure including road, rail, electrical, water and telecommunications...”, but no mention is made of minimising impacts on agriculture either through fragmentation of GQAL or SCL or through exacerbated flood impacts.³²

Under section 14 of the draft GBSDA Scheme, landholders and others with interest in land affected by the scheme must apply in writing to the Coordinator General to continue making use of the land. This may be granted, as long as they had approval to use the land in that way before the SDA comes into effect, and as long as the SDA scheme doesn't state another use for the land in question. To make such an application, they must pay a fee, and provide documentation demonstrating that the use they want to make of the land was permitted prior to the SDA coming into effect. The Coordinator General has the power to refuse the application, with no right of appeal.

Map 3: Proposed Galilee Basin State Development Area Precincts



The precise details of the actions that the Queensland Government proposes to take to facilitate development within this corridor are not yet clear, but the draft State Development Area Strategy, which was placed on public exhibition in early 2014, outlines a range of potential measures, including discounted water licences, discounted royalties, Government facilitation of industry cooperation and compulsory acquisition of land in the SDA.

³² QCG, 2014, pp13-14

During the period that the Galilee Basin State Development Area has been on public exhibition, residents of Merinda and Collinsville have expressed concern about the impact of compulsory acquisition on their communities, and the State Government responded to this concern by announcing the residential areas in those towns would not be subject to compulsory acquisition for the railways.³³ This is no doubt cold comfort for those townspeople whose livelihoods depend on the broader agricultural industry of the region, because no such commitment has been made about important agricultural areas.

The last major coal haulage railway for which the Queensland Government facilitated compulsory acquisition has stalled indefinitely thanks to the withdrawal of a major partner, and the timeline for constructing the line is now unknown. The Surat Basin Infrastructure Corridor State Development Area (SDA) was declared on 24 November 2011, allowing the Coordinator-General to regulate land uses in the corridor and acquire the land, or an interest in land, within the SDA to establish the infrastructure corridor. The Queensland Government is now offering to make ex-gratia payments of \$10,000 each to 36 landholders in the area to make amends for the uncertainty they have faced, with the Deputy Premier quoted saying, "This is a unique situation where property owners have been dealing with uncertainty for seven years and may continue to do so due to being within a declared State Development Area."³⁴

Landowners and their representatives, however, indicated that this sum falls woefully short of the 30% loss in land values they have suffered as a result of the proposed rail line, and the hundreds of hours they spent grappling with the process.³⁵ Despite this fiasco, the Government appears intent on following a similar strategy with landholders in the Mackay, Isaac and Whitsunday Region. It is worth noting, too, that the proponent of the Alpha Coal project has had the power to request compulsory acquisition since October 2010, when the project was designated an "Infrastructure Facility of Significance," and yet the project has still not begun work.

There is no reason to believe that the declaration of this SDA, to facilitate high risk, high capital coal mine proposals during a period when the coal industry is in downturn, will end any differently to the Surat Basin fiasco, and it will again be the agricultural communities, and the soft infrastructure that supports them, that will be the losers.

3.1 The Mackay, Isaac and Whitsunday Region

The Region most affected by the GBSDA is the Mackay, Isaac and Whitsunday Region. The agricultural land resources, rivers and existing railways are shown in Map 4, as is the area of the region that is captured by the GBSDA. The Regional Plan for the region recognises that, "Strategic Cropping Land and Good Quality Agricultural Land is a valuable asset to be recognised and protected. Alienation and loss of this resource through fragmentation, urban development, mining or other high impact development will not be supported, unless there is an overriding need in the public interest for the proposed use, and there are no alternative locations available."³⁶ (See Maps 5 to 8 and Map 16 for areas of SCL and GQAL with the MIW Region).

Is there an overriding need in the public interest to alienate and sterilise this agricultural land to open the Galilee Basin for coal production and build railways to ship that coal?

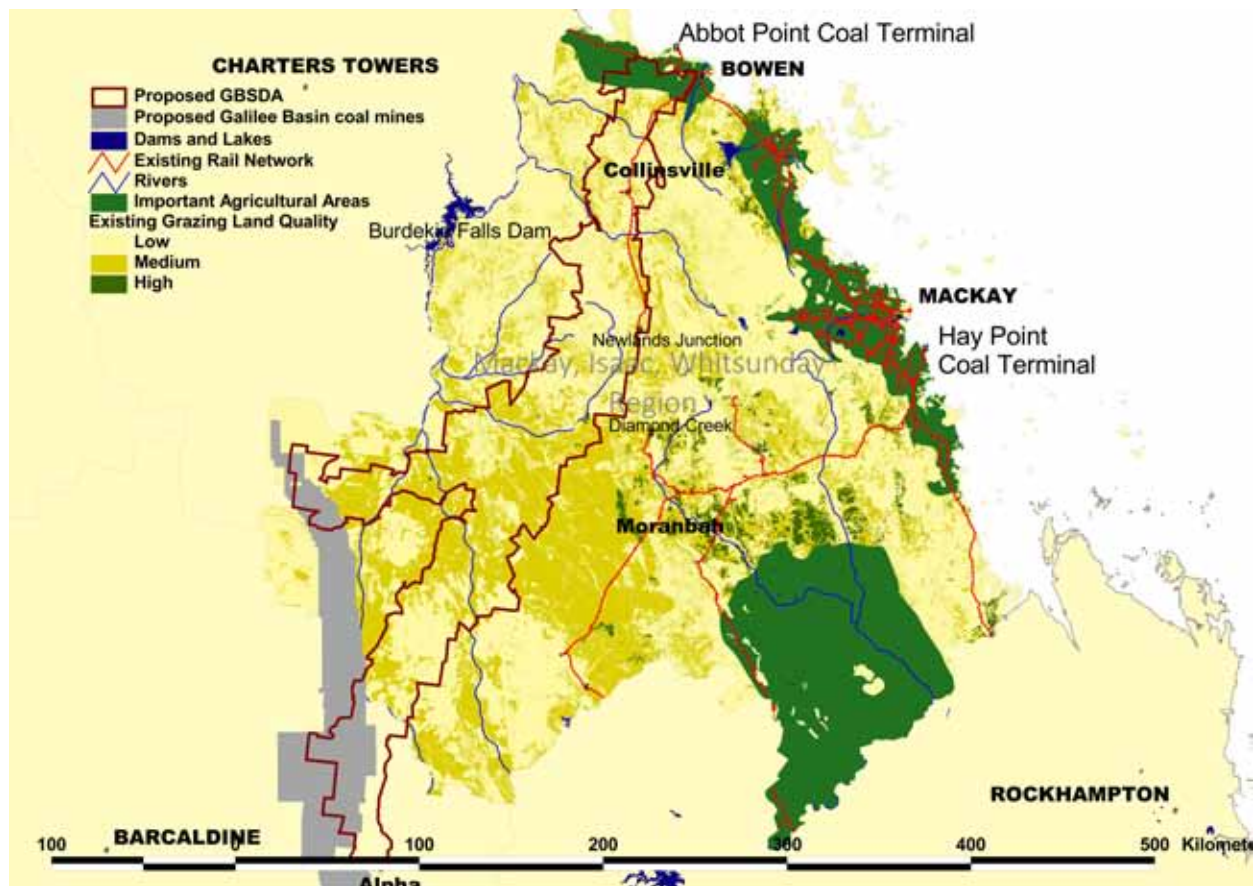
³³ Deputy Premier Jeff Seeney. 4 March 2014. Media Release "Urban areas in North Queensland towns shielded from rail corridor"

³⁴ Deputy Premier, Minister for State Development, Infrastructure and Planning, 2013.

³⁵ Quoted in Penelope Arthur, 12 December 2013. 'Wandoan's rail woe.' Queensland Country Life.

³⁶ Queensland Department of State Development, Infrastructure and Planning, 2012, p 69

Map 4: Regional context: mines, rail and agricultural land

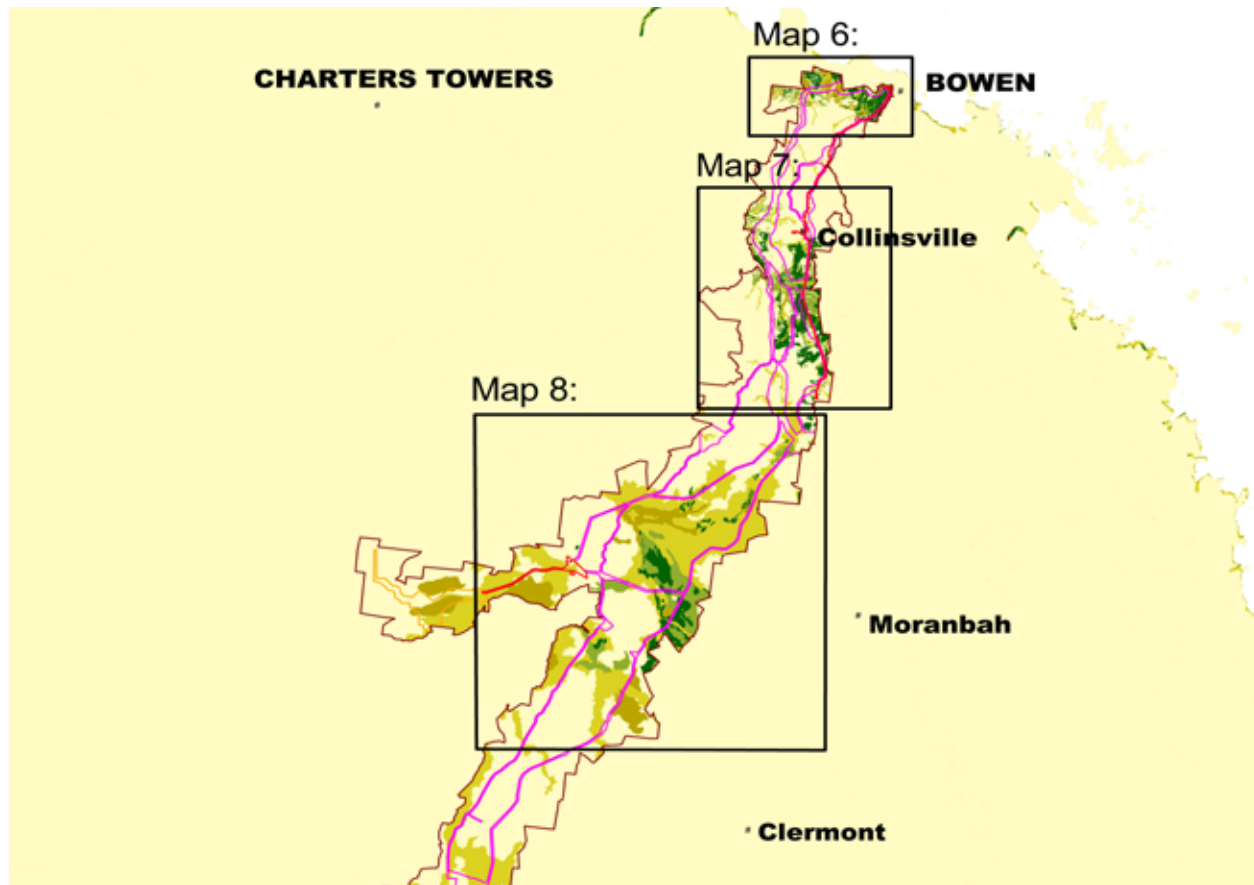


Grazing is the predominant land use in the area (98% of Burdekin Catchment- see Map 4), followed by irrigated sugarcane in the Bowen area. Broadly indicative figures for average annual gross value of production are: cropping (mainly sugar and horticulture) around \$450 million; livestock (mainly beef cattle) around \$170 million.³⁷ Grazing properties are typically large (30,000 hectares, herd of 33-3600 cattle) while agricultural enterprises tend to be a lot smaller (119 hectares for sugar cane and 39 hectares for horticulture crops).³⁸ As shown in Map 5, within the region, there are three concentrated areas that are dedicated to cropping: The GBSDA is proposed to overlap with three distinct areas of GQAL. One, near Bowen (see Map 6) is identified as Important Agricultural Area in the Queensland Agricultural Audit. The second surrounds the township of Collinsville (see Map 7). The final area is west of Moranbah in the Mistake Creek Catchment (see Map 8).

³⁷ Beare et al., 2003

³⁸ *ibid*

Map 5: Location of detail maps

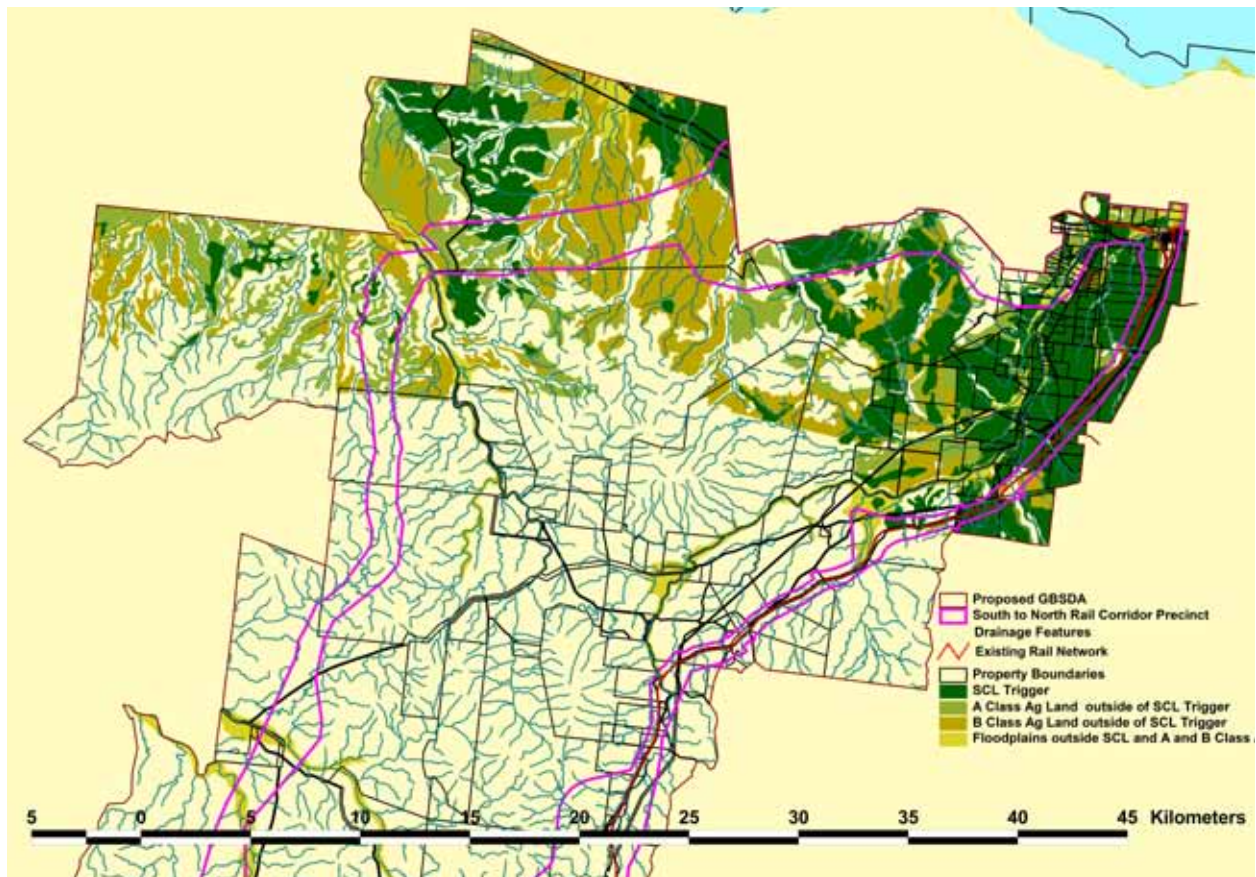


The Whitsunday area, including the Lower Burdekin and Don River deltas (Map 6) is one of the highest yielding sugarcane producing areas in Australia with around 40,000 ha of land under cane.³⁹ The subregion supports a multimillion dollar horticulture industry, predominantly within the Bowen area, which supplies a significant proportion of Queensland's tomatoes, capsicum, green beans and sweet corn, as well as high-quality mangoes.⁴⁰

³⁹ Charlesworth et al., 2002.

⁴⁰ State of Queensland, 2012, p36

Map 6: Agricultural land in the Lower Burdekin and Don River delta, near Bowen

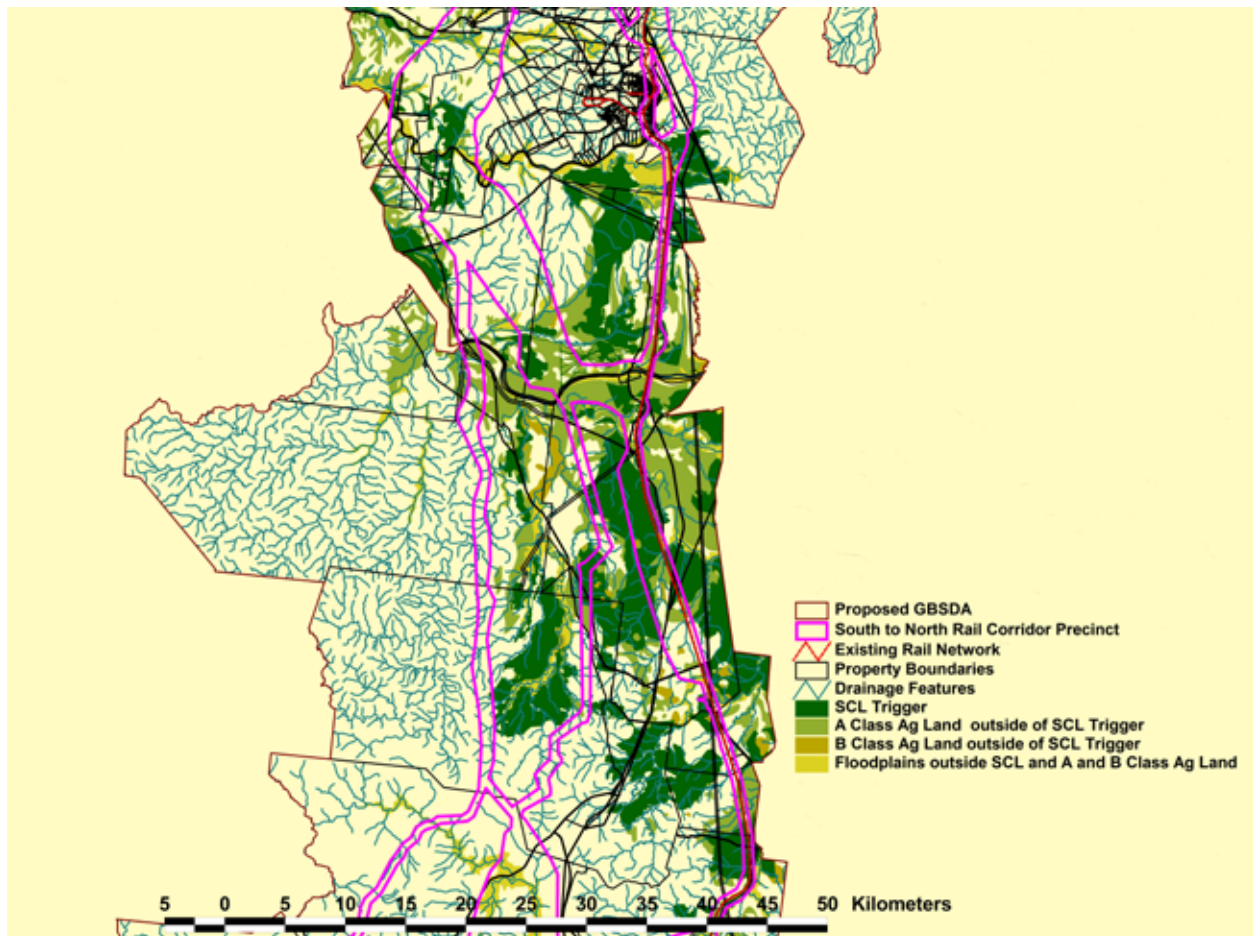


It is estimated by the Burdekin Dry Tropics Board (2005) that around 6,400 ha of cotton and grain crops are irrigated in the Belyando River catchment with about half of this area located in the Mistake Creek sub-catchment (See Map 8). This irrigation tends to occur in alluvial plains adjacent to the main stems of the river or its larger tributaries.⁴¹ Within the Mistake Creek sub-catchment, farmland under irrigation most commonly produces cotton. Forage, maize, cereal crop and pasture are currently the most commonly irrigated crops. While there is some pressure to expand irrigated agriculture, financial constraints within the farming industry may inhibit such development.⁴²

⁴¹ Burdekin Dry Tropics Board, 2005.

⁴² *ibid*

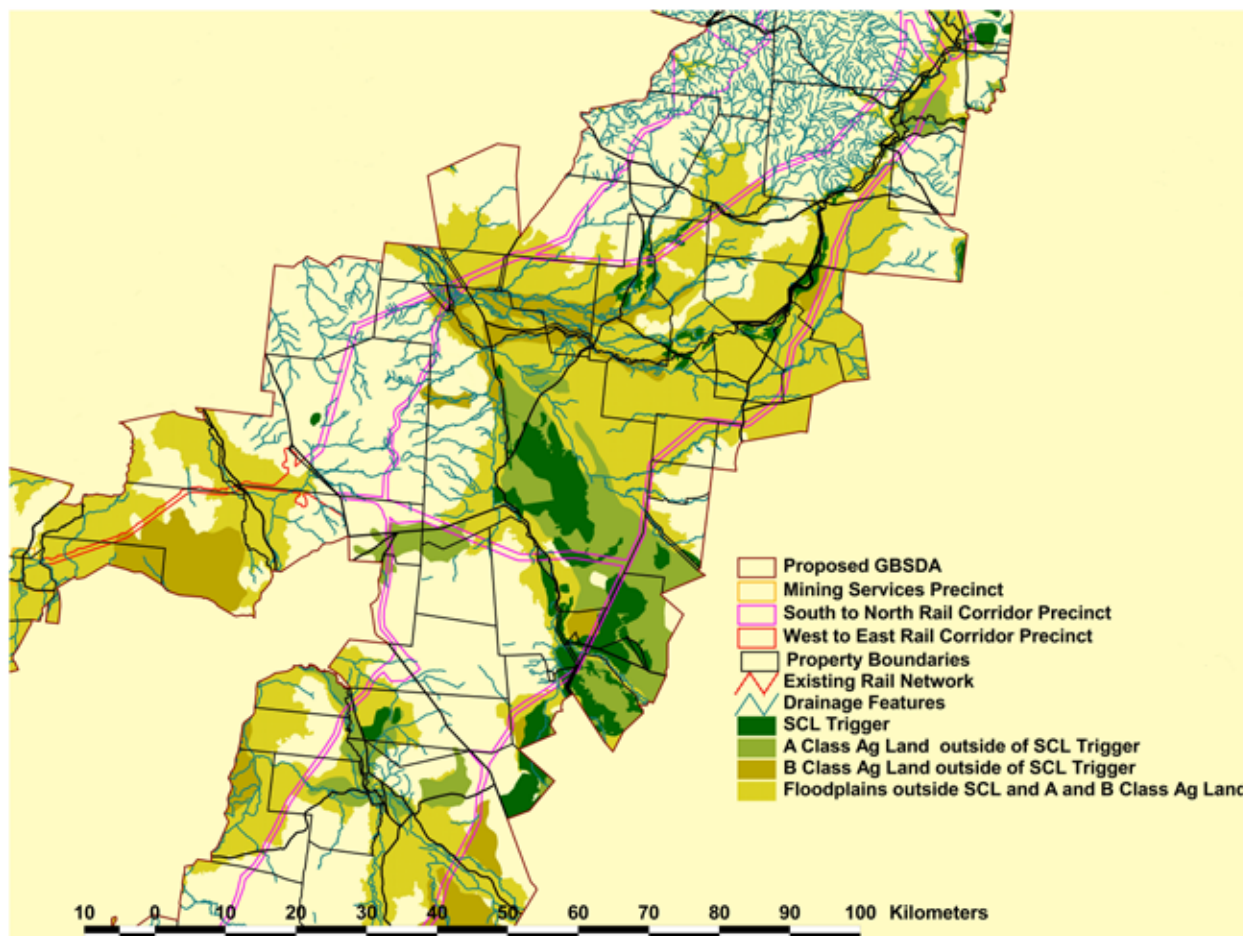
Map 7: Important agricultural land near Collinsville



The Region is experiencing significant economic growth, with an average growth rate of 5.5 per cent per annum compared to a state average of 2.3 per cent. Agricultural activities in the region contribute 9.5 per cent of Queensland's total agricultural production.⁴³

⁴³ DSDIP, 2012, p 17

Map 8: Agricultural land in the Mistake Creek subcatchment



3. 2. Individual rail proposals within the GBSDA

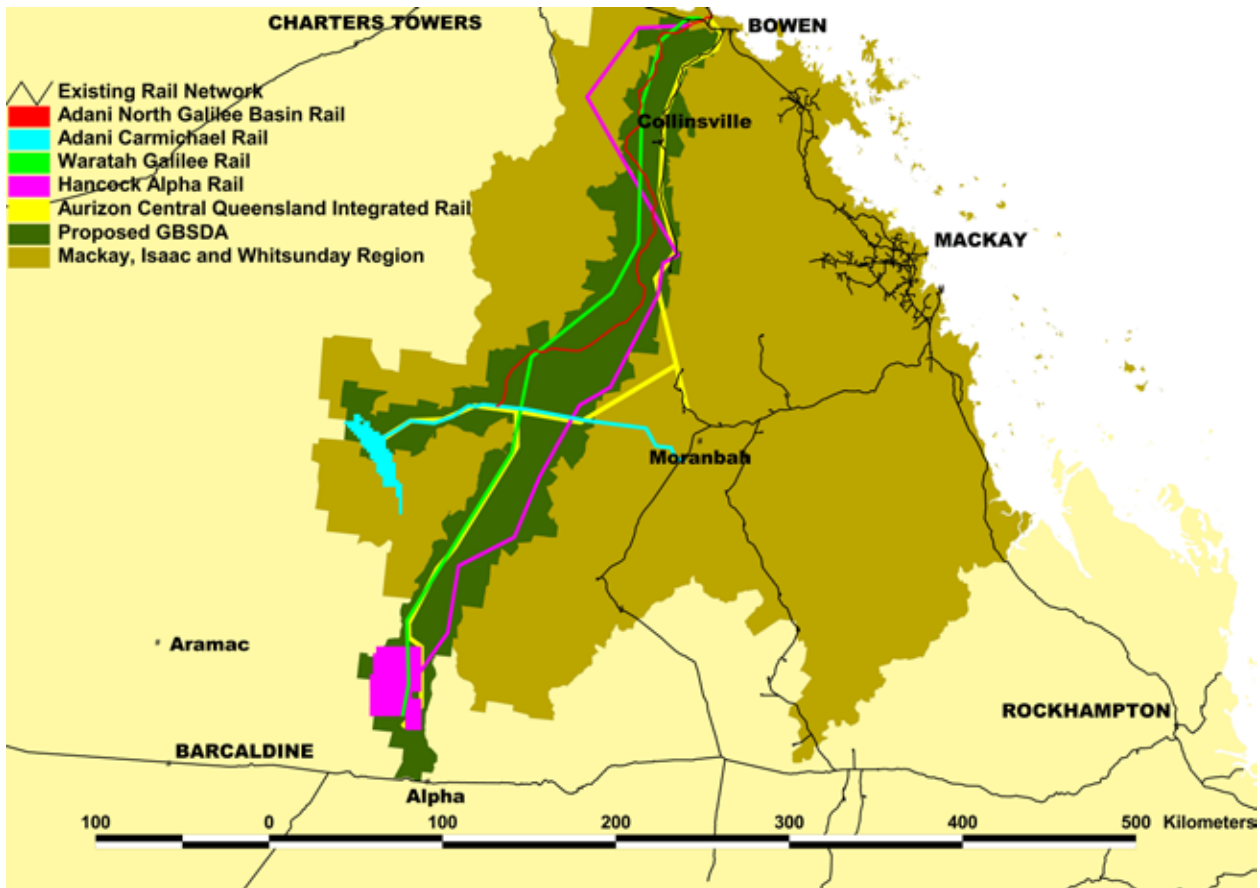
As shown in Table 3, the five rail proposals within the Galilee Basin State Development Area are at different stages in the planning process.

Table 3: Rail proposals in the Galilee Basin State Development Area

| Proponent | Name of project | Length (km) | Stage |
|--------------------------|---|-------------|----------------------------|
| Adani Mining Pty Ltd | Carmichael Coal Mine and Rail Project | 189 | Supplementary EIS |
| Adani Mining Pty Ltd | North Galilee Basin Rail Project | 303 | EIS |
| Aurizon Holdings Limited | Central Queensland Integrated Rail Project | undefined | Terms of reference for EIS |
| GVK Hancock Coal | Alpha Coal Project | 495 | Approved |
| Waratah Coal Pty Ltd | Galilee Coal Project (Northern Export Facility) | 453 | Approved |
| Total | | 1440 | |

Source: Rail proponent EIS documents

Map 9: Railway proposals in the GBSDA



There are five rail lines proposed for the GBSDA, as shown in Map 9, and these have the potential to interact to produce a cumulative impact. GVK Hancock Coal's Alpha Coal Project (Rail) and Waratah Coal's Galilee Coal Northern Export Facility (Rail) have been given government approval and Adani's Carmichael Rail and North Galilee Rail Project are awaiting approval. Aurizon's Central Queensland Integrated Rail Project is yet to submit detailed assessments.

Adani has stated in the EIS for the Carmichael project that, "It is likely that only one of these rail lines will proceed."⁴⁴ Adani also admit in their EIS that "the additional trains associated with the [Carmichael] Project (Mine) production can be accommodated on the existing rail network in conjunction with the Project (Rail), subject to planned capacity upgrades proposed by [Aurizon]..."⁴⁵ And yet, the company is still proposing two of the five railway lines that are the subject of this report. We are not able to determine which or how many of these five projects will proceed to being built, and this leaves the agricultural producers of the region in confusion and anxiety about the future of their farms and livelihoods. What is clear, though, is that the Queensland Government is going out of its way to facilitate and encourage their development as hastily as possible.

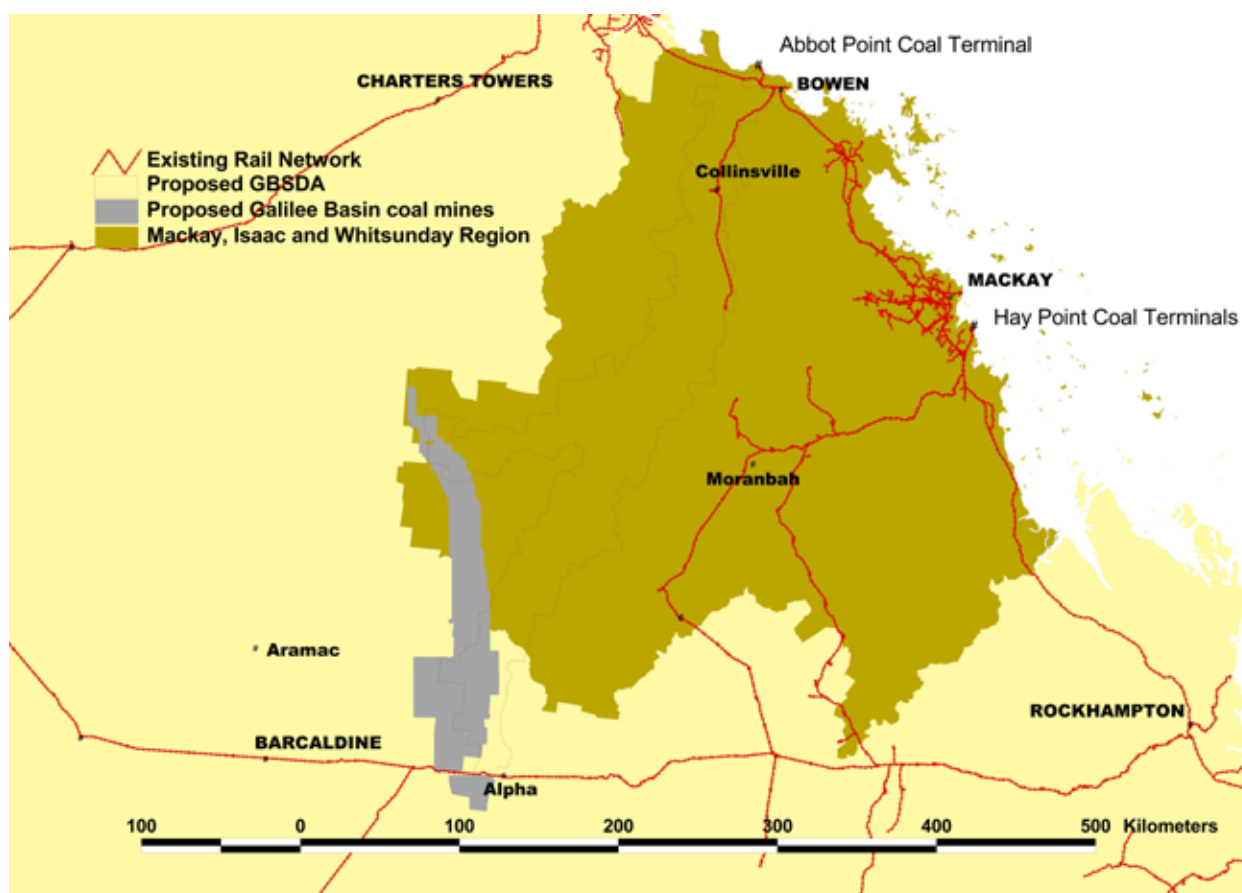
⁴⁴ Adani Mining Pty Ltd, 2013c, p25

⁴⁵ Adani Mining Pty Ltd, 2013c, p30

3.2.1 Existing rail Infrastructure

Aurizon's existing Goonyella System services more than 30 coal mines in the northern and central areas of the Bowen Basin. The nearest point of this existing railway system to Adani's proposed Carmichael Rail Project is the Blair Athol Branch near Moranbah, as shown in Map 10. The now-completed Goonyella to Abbot Point expansion project has linked the previously separated Newlands and Goonyella Rail systems and increased the capacity of rail haulage to Abbot Point coal terminal to 50mtpa. After the completion of Aurizon's Goonyella Rail Expansion Project, which is currently under construction, the Goonyella System will have coal haulage capacity to Hay Point and Dalrymple Bay Coal terminals near Mackay of 140mtpa, making it the single largest export coal rail network in the country.⁴⁷

Map 10: Existing rail system



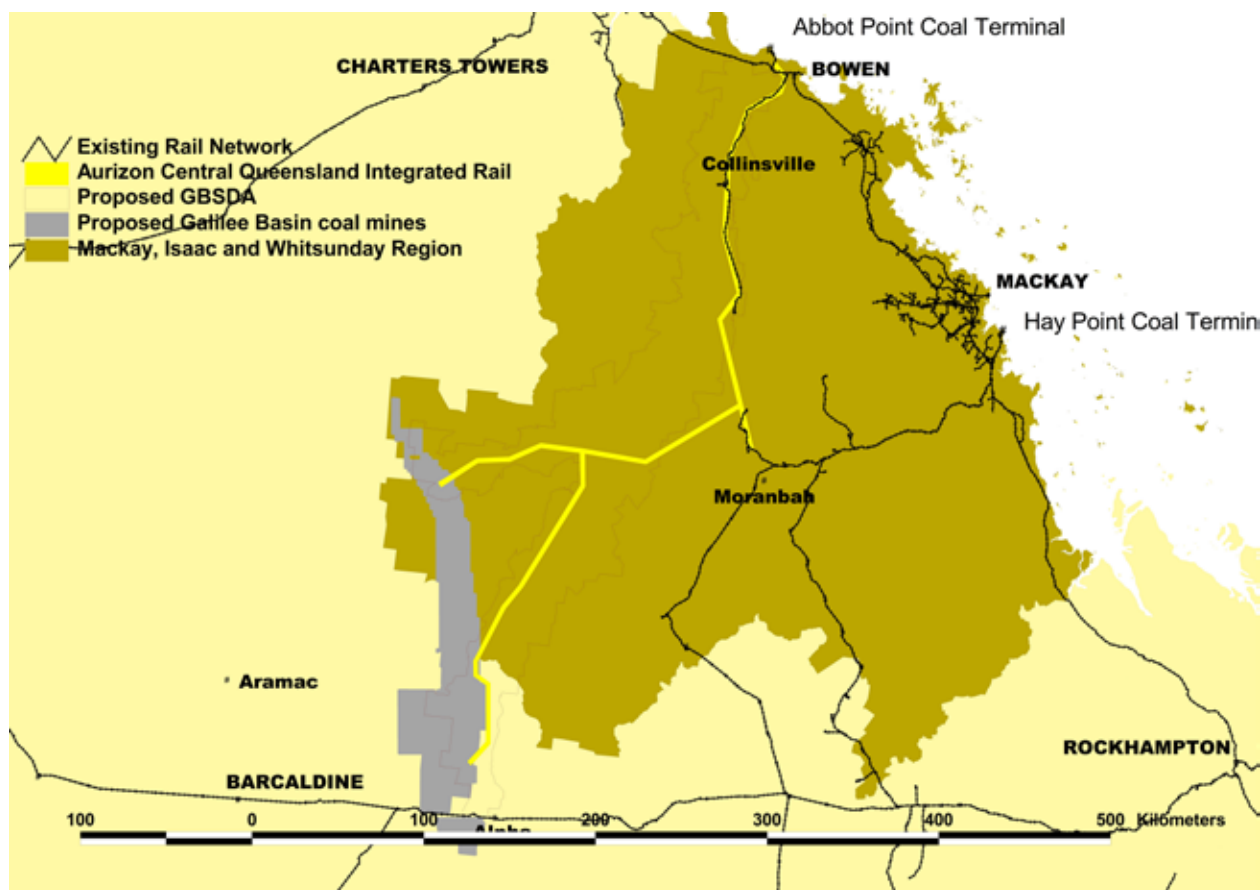
3.2.2 Aurizon – Central Queensland Integrated Rail Project

Aurizon has lodged an interim advice statement for their Central Integrated Rail Project with the aim of integrating a rail network from the Galilee Basin to the coal ports in the east, in particular Abbot Point, and further expand access to Abbot Point for the expanding and new mines in the Bowen Basin. Aurizon has seen an opportunity to connect new narrow gauge rail infrastructure from the Galilee Basin to its existing Central Queensland Coal Network, and maintain its near-monopoly on coal rail haulage in Queensland.

⁴⁶ Adani Mining Pty Ltd, 2013d, p70

⁴⁷ For the current status of the Goonyella Rail Expansion Project, see <http://www.aurizon.com.au/projects/goonyella-rail-expansion-project>

Map 11: Aurizon Central Queensland Integrated Rail Project



The greenfield rail in this project comprises three sections:

- Diamond Creek to Newlands Junction (See Map 11)
- Central Galilee to Diamond Creek – this section is proposed to follow an alignment that is broadly consistent with one of the proposals from Adani (See Map 12)
- South Galilee to Galilee Junction – this section is proposed to follow an alignment that is broadly consistent with that proposed by Waratah Coal

The proposal is to upgrade the existing line from Newlands Junction to Abbot Point, passing through Collinsville (see Map 11).

This proposal was declared by the Queensland Government to be a significant project on 27 January 2012. The proposal was determined to be a controlled action requiring an EIS for assessment under the Federal Environment Protection and Biodiversity Conservation Act on 19 April 2012.

More recently, Aurizon has signed an agreement with GVK Hancock Coal to enter into negotiation about buying half of Hancock Coal Infrastructure Pty Ltd, the company developing the Alpha rail proposal and the T3 coal terminal at Abbot Point, and develop a Galilee Basin rail line together. Aurizon's statement upon signing that agreement notes that "The proposed new rail solution would be located within the Queensland Government's preferred rail corridors for the development of the Galilee Basin as defined under Queensland Government policy announced in June 2012, and is intended to align with Government policy on shared infrastructure and open access."⁴⁸ Though this agreement implies that it is the approved Alpha rail line that will be developed together by these companies, Aurizon has not withdrawn their own, separate, narrow gauge Galilee rail project.

3.2.3 Adani - North Galilee Basin Rail Project and Carmichael rail

As part of their Carmichael project, Adani proposed to develop a privately-owned narrow gauge rail line connecting with the existing Aurizon rail infrastructure to the coal terminal facilities at the Port of Abbot Point and the Dudgeon Point expansion at Hay Point, south of Mackay. The rail line was proposed to transport 60 million tonne per annum of thermal coal from its Carmichael mine in the north Galilee Basin approximately 160 km north-west of Clermont in Central Queensland for 90 years - the stated approximate mine operating life.⁴⁹

The Rail Project proposes to connect the Mine to the existing Goonyella and Newlands rail systems and includes a 120 km dual gauge portion from the mine site running west to east to Diamond Creek and a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah.

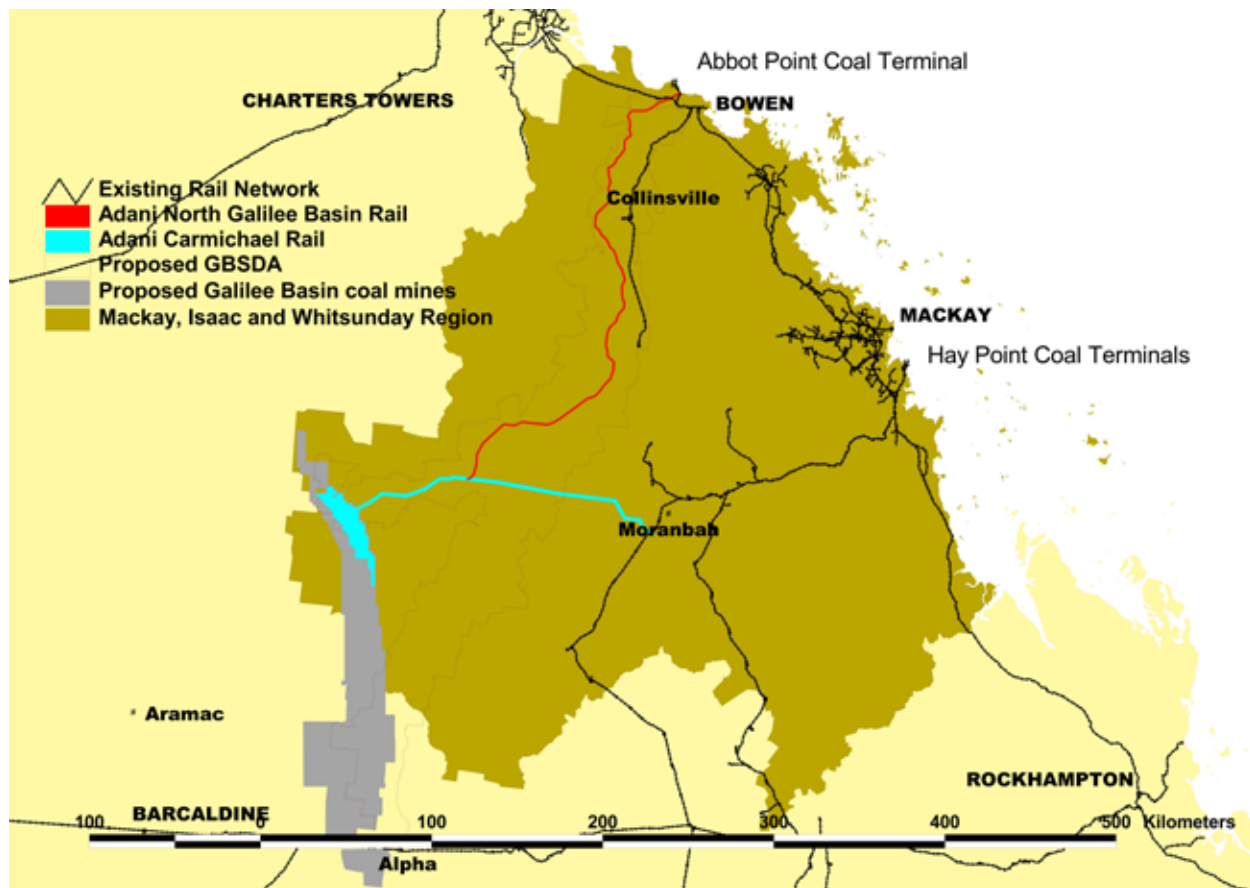
Adani Mining Pty Ltd (Adani) also proposes the construction and operation of the North Galilee Basin Rail Project (NGBR Project), a multi-user, standard gauge, greenfield rail line that will transport coal from mines proposed in the northern Galilee Basin to the Port of Abbot Point with a 32.5 tonne axle load. The NGBR Project is approximately 300 km long and connects the proposed Carmichael Coal Mine and Rail Project's east-west rail corridor, approximately 70 km east of the proposed Carmichael Coal Mine in the vicinity of Mistake Creek, to the Abbot Point coal terminals. The NGBR Project will have an operational capacity of up to 100 million tonnes per annum (mtpa) of coal product expected to be sourced from both Adani and third-party mines in the northern Galilee Basin.⁵⁰

⁴⁸ Aurizon 2013.

⁴⁹ The Supplementary EIS for the Carmichael mine has revised the expected life of the mine down from 90 years to 60 years. However, the more recent EIS for the North Galilee Basin Rail project still states that Carmichael will operate for 90 years. Such discrepancies and inconsistencies are common in the environmental assessment documents for the Galilee Basin coal mines and associated infrastructure.

⁵⁰ GHD, 2013a, p1

Map 12: Adani North Galilee Basin Rail and Carmichael Rail



Adani has considered developing or utilising a consolidated corridor with Waratah Coal's proposed China First Project, or GVK Hancock Coal's proposed Alpha Coal Project, both of which include proposals for standard gauge rail infrastructure. However, according to Adani, "uncertain development timeframes and the identification of a more direct rail route has left Adani with limited potential for co-use of these railways."⁵¹ Adani's original rail proposal, the Carmichael Coal Mine and Rail Project, proposed to connect to the existing Aurizon narrow gauge network in the Goonyella and Newlands system. This would require Aurizon to develop an alignment between Newlands Junction and Diamond Creek and upgrade the existing alignment from Newlands Junction to Abbot Point.

In the EIS for the North Galilee Basin Rail Project, Adani complains that this would constrain the speed and scale of their export enterprise, because the Aurizon systems "are narrow gauge, having a much lower axle load with limited capacity for upgrade, all of which combined would act to increase coal prices and reduce the cost competitiveness of Galilee Basin coal in the global market."⁵² Adani states that, "uncertainty with regard to Aurizon's development timelines in addition to the above technical aspects," has led them to "propose the much shorter and direct route to Abbott Point, standard gauge, NGBR Project." This implies that the company no longer wishes to pursue the Carmichael Rail project, but that proposal has not formally been withdrawn. Their reference to Abbot Point as the Port to which coal mined from their Carmichael project would be shipped also implies that they have abandoned the idea of shipping coal through the huge new Dudgeon Point coal terminal, proposed to be built near Hay Point, but again, this proposal has also not been formally withdrawn.

⁵¹ GHD, 2013a, p 3

⁵² *ibid*

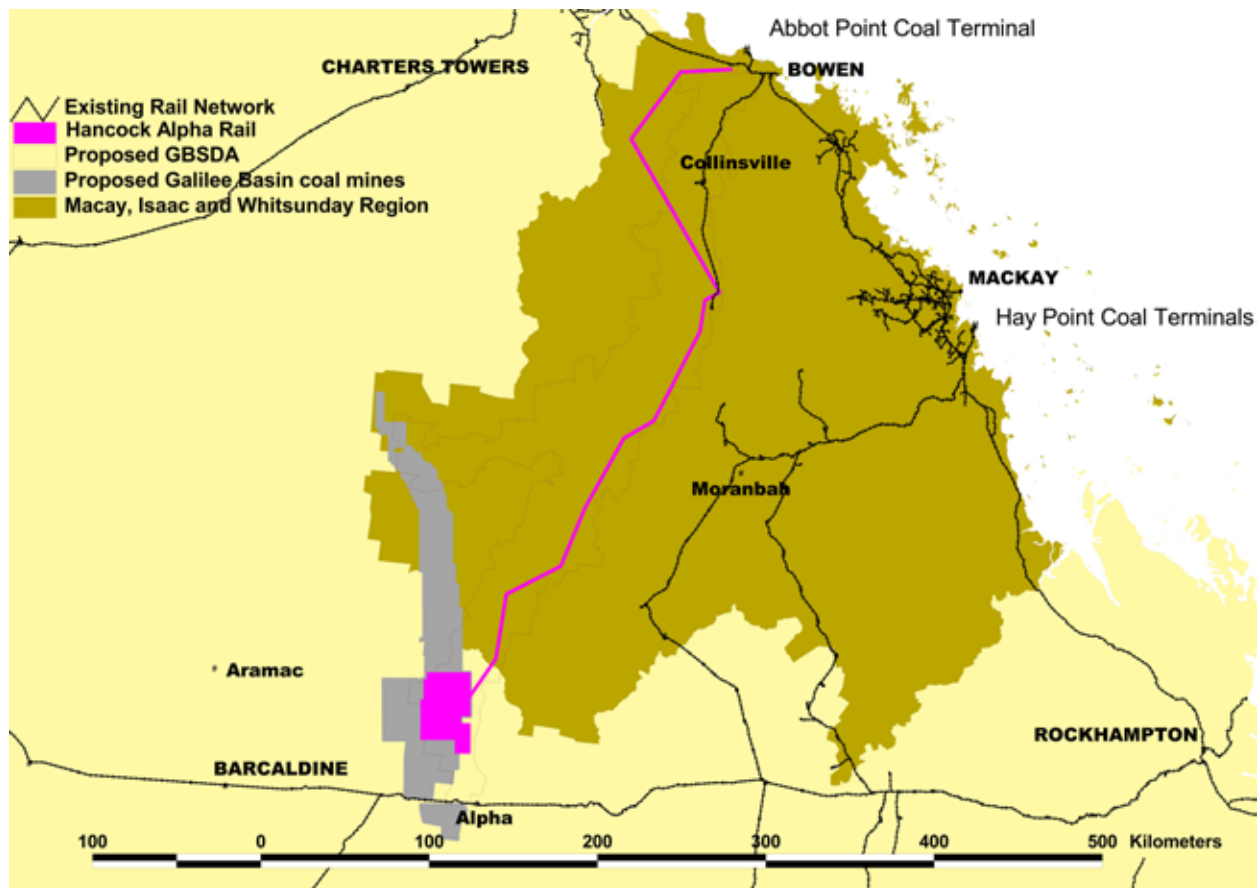
⁵³ *ibid*

The expected cost of the operation and maintenance of the NGBR Project is claimed by Adani to be in the order of \$2.50 per tonne and they expect operation of the NGBR Project to coincide with completion of construction and commencement of production from the Carmichael mine, currently expected to begin 2016 and continue for 90 years.⁵⁴

3.2.4. GVK Hancock - Alpha Rail Project

The approved Alpha Coal Project includes construction of a 495 km rail line⁵⁵ to transport coal from the Alpha coal mine, 50 km north of the township of Alpha, to Abbot Point. The rail line proposes to transport up 60mtpa of coal on a single standard gauge track and service both of GVK Hancock’s approved Galilee Basin mines, Alpha and Kevin’s Corner, as well as other customers to whom GVK Hancock Coal have promised access, such as QCoal, with whom GVK Hancock Coal signed an MOU in December 2012, promising to allow QCoal to utilise 20mtpa of GVK Hancock’s 60mtpa rail capacity.⁵⁶

Map 13: GVK Hancock Alpha coal rail project



⁵⁴ GHD, 2013b. p35

⁵⁵ Hancock Prospecting Pty Ltd, 2011e., p1

⁵⁶ See GVK Hancock press statement 11 December 2012 http://www.gvk.com/files/australiancoverage/GVK_Hancock_signs_deal_with_QCOAL_Australia_for_c_2c41a488b3b94f9d867f39f461041393.pdf

The Project footprint comprises an easement of 495km long and 500m wide as well as a series of laydown areas and construction nodes, local construction access tracks and local maintenance access tracks.⁵⁷

In October 2013, the Queensland government declared the Alpha mine and rail project, and the related Kevin's Corner mine, a "prescribed project" under the State Development Public Works Organisation Act.⁵⁸ This gives the Coordinator General the power to issue orders to speed up administrative process, or to assume responsibility for assessing and making a decision on a project, in place of another decision-maker. The Alpha project has also been, since October 2010, a declared "Infrastructure Facility of Significance" which also gives the private company building the project power to apply to compulsorily acquire land for it.⁵⁹ All of this facilitation and red-tape cutting by the Queensland Government has not managed to bring the project forward speedily, indicating that the delays being experienced may have their origin in the sentiment of the coal and financial markets, which no amount of compulsory acquisition can coerce.

3.2.5. Waratah Coal – Galilee Coal Rail Project

Waratah Coal proposes a greenfield standard gauge railway about 468km from the Galilee Basin to the port of Abbot Point to support 25,000 tonne wagons. The easement is expected to be 60 to 80m wide and include rail and a service road. The rail alignment was increased from its original 60mtpa to 400mtpa design capacity. According to Waratah Coal, the increase was "instigated by concerns from community and government regarding the environmental and social impact of multiple rail alignments from the Galilee Basin."⁶¹

The 400mtpa capacity line would, according to Waratah, mean one 3.2km long train travelling at 80km per hour loaded, or 100km per hour empty, every 22 minutes for 300 days of the year.⁶²



Image Page 30: Paula Heelan

⁵⁷ Hancock Prospecting, 2010e, p6

⁵⁸ See the list of Queensland's "prescribed projects" here; <http://www.dsdip.qld.gov.au/infrastructure-delivery/list-of-prescribed-and-critical-infrastructure-projects.html>

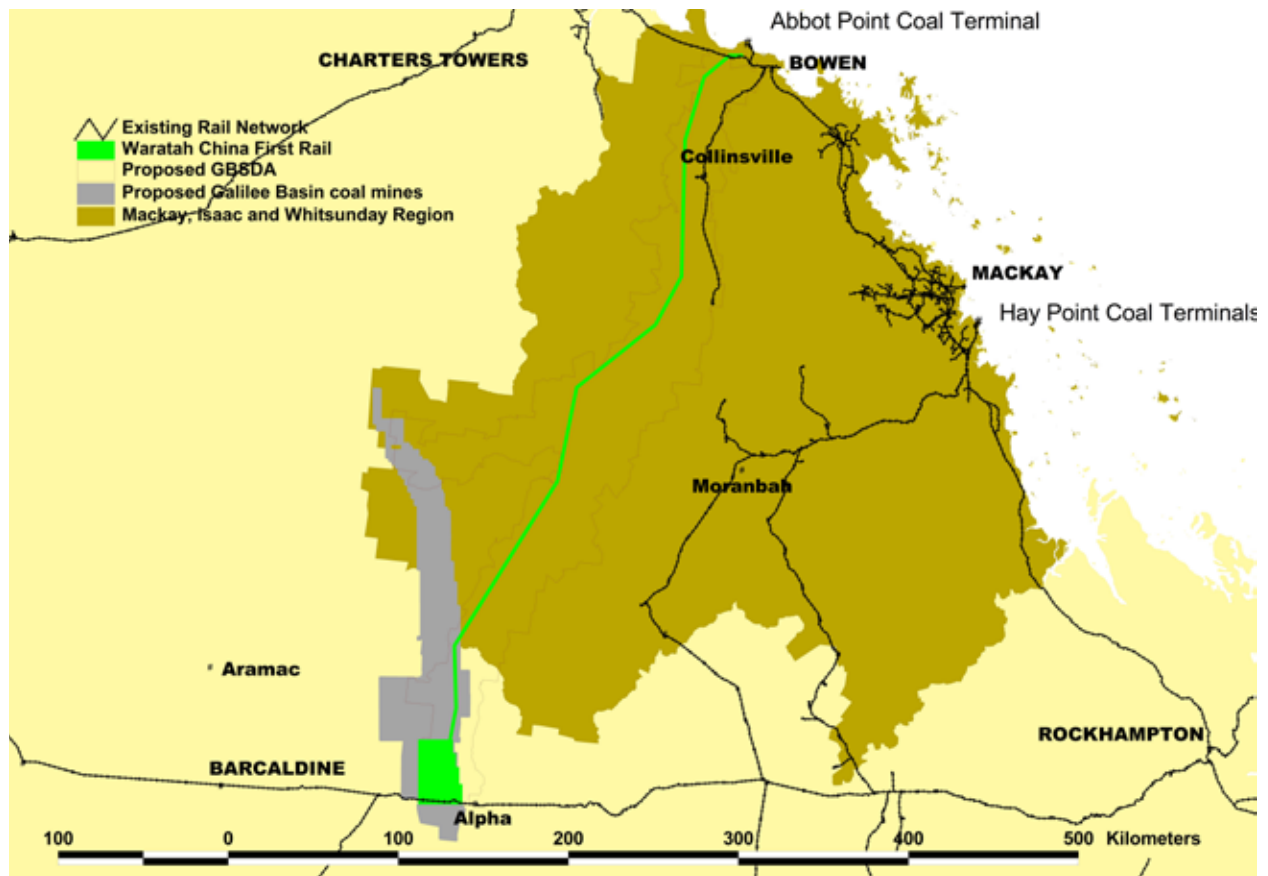
⁵⁹ See the list of Queensland's "Infrastructure Facilities of Significance" here; <http://www.dsdip.qld.gov.au/assessments-and-approvals/approved-infrastructure-facilities-of-significance.html>

⁶⁰ Waratah Coal, 2011a, p3

⁶¹ op cit, p4

⁶² op cit, p10

Map 14: Waratah Coal Galilee Coal Project



The rail component of the project includes two 8 km long rail loops linking the two rail loading stations at the mine to the rail line and a 468km single track to the Abbot Point State Development Area.⁶³ Waratah anticipated initial coal handing capacity of the proposed rail to allow for 60 million tonnes per annum but expected this to escalate up to 400 Mtpa over a 15-20 year period, including up to sixteen passing loops and nine bridge crossings of major rivers.⁶⁴

⁶³ op cit, p14

⁶⁴ ibid

4. Agriculture in the GBSDA

The GBSDA extends over 20,000 square kilometres and some of the State's most productive agricultural land, containing almost 400,000 ha of Class A and B agricultural land and almost 60,000 ha of potential Strategic Cropping Land (SCL).

Pastoral farming is undertaken across the GBSDA area, with small areas of cropping to provide cattle fodder. Many properties comprise a mix of productive grazing land used for 'finishing' cattle prior to market sale, and less productive land used for general grazing.⁶⁵

As shown in Map 15 and Table 4, the GBSDA intersects with close to 400,000 ha of Class A and B Good Quality Agricultural Land and almost 60,000 ha of potential Strategic Cropping Land (SCL). Table 6 shows the agricultural importance of the areas within the GBSDA as it covers more than 1.8 million hectares of grazing land, 57,870ha of which is categorised as high quality, 400,000 ha of potential agricultural land, almost all of which has been classified by the Agricultural Land Audit as potential intensive livestock production. Table 6 also shows that the GBSDA includes over 250,000 ha of potential annual horticulture, 80,000 ha of potential perennial horticulture and 72,000 ha of potential cropping land, and almost 60,000 of a mapped Important Agricultural Area – near Bowen.

In addition, as shown in Table 6, the State Development Area captures over half a million hectares of land on four floodplains. Table 6 shows the GBSDA precincts crossing over 1680 waterways between the Galilee Basin and Abbot Point, all of which will require drainage works potentially exacerbating flood impacts. The impacts the rail lines would have on flooding and hazards in these lands are discussed in Section 5 of this report.

Table 4: Mapped Agricultural land class A and B polygons intersecting with GBSDA

| Agricultural Land Category | Descriptor | Area - Ha |
|----------------------------|---|-----------|
| A | A1 : Crop land - broad acre and horticultural | 252,439 |
| B | B : Limited crop land | 131,779 |
| B | B/C: Mix of class B and class C land | 7,141 |
| TOTAL | | 391,359 |

Source: DAFF, 2011. Note: Intersecting polygons include those that extend outside of the GBSDA. I.e. this total is somewhat greater than the ALA land within the GBSDA.

⁶⁵ Adani Mining, 2013a, p21

Map 15: Agricultural Potential within the GBSDA

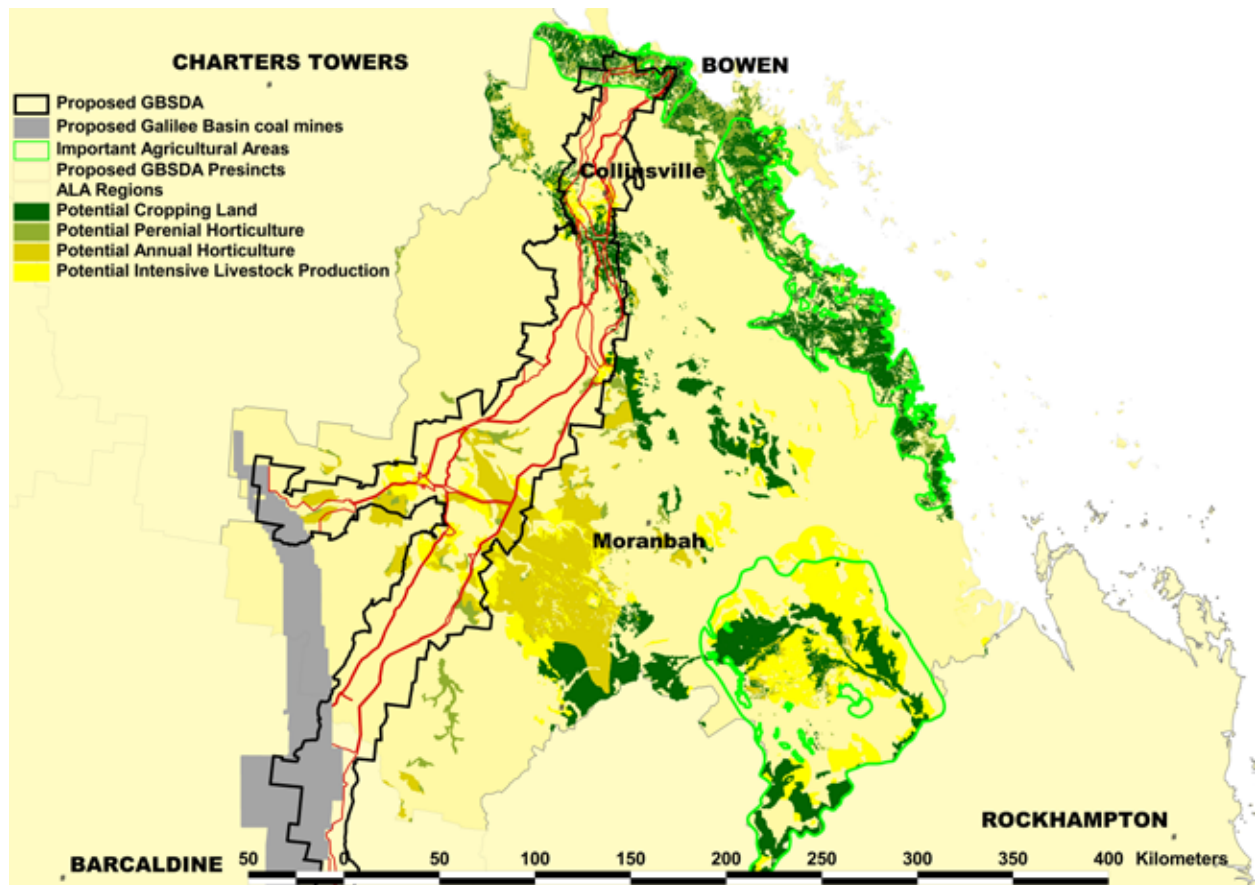


Table 6 summarises, not just the area of agricultural land captured by the State Development Area, but the lands that fall within the proposed GBSDA precincts in which rail projects are likely to be built. The table shows that the North to South railway precinct includes 12,040 ha of land that was originally identified in the Strategic Cropping Land trigger map, but that 10,567ha of this land has now been found to be not Strategic Cropping Land through the history of cropping invalidation process outlined in Section 2.2 of this report. In order to qualify for protection, all land in the Strategic Cropping land trigger map must go through such a “validation decision.” In these and all other cases, the decisions was made to invalidate the Strategic Cropping Land, on the basis of its lack of cropping history. In other words, 87% of the land in the precincts that had been identified as Strategic Cropping Land has now been assessed out of existence.

Table 6 also shows that the proposed GBSDA precincts could sterilise almost 200,000 ha of pasture, over 50,000 ha of which has been identified as potential intensive livestock production, as well as 11,000 ha of the Bowen Important Agricultural Area. The proposed precincts will also sterilise over 50,000 ha of potential cropping and horticulture land.

Table 6: Agricultural land within GBSDA proposed precincts

| | | Area in GBSDA ha | South to North | West to East | Mining Services |
|----------------------------------|--|------------------|----------------|--------------|-----------------|
| GBSDA | TOTAL | 2,109,001 | | | |
| | South North Corridor Precinct | 213,515 | 213,515 | | |
| | West to East Corridor Precinct | 6,245 | | 6,245 | |
| | Mining Services Precinct | 31,565 | | | 31,565 |
| | TOTAL | 251,325 | 213,515 | 6,245 | 31,565 |
| Flood plains⁶⁶ | | | | | |
| | Don River | 7,926 | 1,216 | - | - |
| | Lower Burdekin River | 3,066 | 522 | - | - |
| | Suttor River | 541,557 | 32,851 | 3,326 | 9,839 |
| | Bowen River | 27,417 | 6,042 | - | - |
| | TOTAL | 579,966 | 40,631 | 3,326 | 9,839 |
| Existing grazing land | | | | | |
| Category | | | | | |
| | Low | 1,080,470 | 96,026 | 1,298 | 10,941 |
| | Medium | 751,178 | 64,768 | 4,945 | 20,407 |
| | High | 57,870 | 526 | - | - |
| | TOTAL | 1,889,518 | 161,320 | 6,243 | 31,349 |
| | ALA Important Agricultural Land ⁶⁷ | 59,402 | 11,162 | - | - |
| Agricultural Potential | | | | | |
| | Potential Annual Horticulture ⁶⁸ | 258,985 | 25,189 | 154 | 8,871 |
| | Potential Perennial Horticulture ⁶⁹ | 82,434 | 13,750 | 4 | 673 |
| | Potential Cropping ⁷⁰ | 72,427 | 14,774 | - | - |
| | TOTAL | 413,847 | 53,713 | 157 | 9,543 |
| Livestock Potential | | | | | |
| | Potential intensive livestock ⁷¹ | 392,231 | 46,125 | 3,237 | 8,871 |
| Strategic Cropping Land | | | | | |
| | Original trigger map ⁷² | 93,373 | 12,039 | - | - |
| | Excised from trigger map | -1,832 | -326 | - | - |
| | Invalidated by cropping history test ⁷³ | -32,863 | -10,567 | - | - |
| | TOTAL | 58,677 | 1,146 | | |

An analysis of the intersection of the GBSDA proposed precincts with land parcels and station boundaries has revealed that they will intersect at least 933 distinct identified land parcels. A full breakdown of the precincts against stations and land parcels is provided in Appendix 1.

⁶⁷ Identified by the ALA on the basis of advice from regional and industry experts and from synthesis of maps and information on current and potential use of land for the range of agricultural land uses considered by the audit.

⁶⁸ Land of agricultural land class A and class B with slope less than 8 per cent and April to October rainfall less than 500 mm.

⁶⁹ Land of agricultural land class A and class B with slope less than 15 per cent and April to October rainfall less than 500 mm. Excludes land that has cracking clay soils.

⁷⁰ Land of Agricultural Land Class (ALC) A with slope less than 8 per cent and mean annual rainfall greater than 450 mm for 7 out of 10 years.

⁷¹ Includes land of agricultural land class A and class B (and class C1 where it is within 10 km of current cropping) with slope less than or equal to 8 per cent.

⁷² Class A Agricultural Land and Versatile Cropping Land data and 1999 Queensland Land Use Mapping Program (QLUMP) data identified as production from agriculture or plantations.

⁷³ Validation decisions for applications submitted under Section 40 of the Strategic Cropping Land Act 2011 (SCL Act). Under the SCL Act, a validation application can be made to confirm whether an area of land is or is not SCL. In these and all other cases, decisions were made to invalidate SCLs.

4.1 Impacts on agricultural land in the GBSDA

The rail projects proposed for the GBSDA will reduce the area of available agricultural land and fragment the agricultural landscape in the region. Table 8 summarises the size and scale of the railways for which detailed information was available, as well as the area of good quality agricultural land affected by each. Proponents of some railways admit that fragmentation and intrusion of agricultural property, Good Quality Agricultural Land (GQAL) and loss of Strategic Cropping Land (SCL) is an unavoidable cumulative impact of rail construction.⁷⁴ These impacts on the agricultural productivity of the region should have been of paramount importance in the selection of a rail corridor, but this has not always been the case. Rather, it would appear that construction and operating costs have been the overriding factor in most alignments selected by proponents. Though some have claimed to and appear in some case to have taken agricultural land into consideration as a constraint in choosing their alignment, the cumulative loss of good quality agricultural land could be substantial and the Queensland Government has stated its intention to facilitate compulsory acquisition of this land.

Table 8: Details of proposed rail alignments and their impacts on agricultural land

| Proponent | Project | Capacity Mtpa | Length km | Width m | Total ha | No. of properties | GQAL ha |
|-------------|-------------|---------------|-----------|---------|----------|-------------------|---------|
| Waratah | China First | | 453 | 70 | 3171 | ? | ? |
| GVK Hancock | Alpha | 60 | 495 | 60 | 2970 | 38 | 2200 |
| Adani | Carmichael | | 189 | 95 | 1795.5 | 21 | 1334 |
| Adani | NGBR | 100 | 303.4 | 100 | 3034 | 64 | 1669 |
| Aurizon | CQIR | | | | | | |
| Total | | | 1440 | | 10970.5 | | |

Source: Rail proponent's EIS documents

Waratah Coal was so unconcerned with the impact its Galilee China First Project railway would have on agricultural land it didn't even include them in the EIS for the project. Waratah claims that due to "the large number of parcels falling across the entire study area (over 6,400), the treatment of minimising property severance was considered to [sic] detailed for the initial overall assessment." Waratah assumed that the "majority of the properties affected along the rail corridor will be beef cattle stations and agriculture pastures"⁷⁵ implying, perhaps, that pasture and grazing was not an enterprise worthy of assessment compared to something as important as a coal export project. The company admitted, however, that construction of the railway corridor will result in a number of unavoidable impacts on the various land uses that exist across the study area.⁷⁶

Queensland Department of Employment, Economic Development and Innovation submitted to Waratah that the EIS had failed to adequately address the impacts on agricultural land use and good quality agricultural land.⁷⁷ Queensland's Department of Environment and Resource Management (now the Department of Environment and Heritage Protection) likewise submitted that the soil and land suitability assessment had "not been conducted to an acceptable level of detail"⁷⁸.

Waratah's response was to engage a consultant to prepare a thinly-detailed report that downplayed the scale of the impact: "the rail alignment runs through approximately 21 km of Class A or B agricultural land (just under 5% of the length)" and "the rail corridor intercepts

⁷⁴ Adani Mining, 2013c, p12

⁷⁵ Waratah Coal, 2011e, p35

⁷⁶ op cit, p101

⁷⁷ Waratah Coal Pty Ltd, 2013g, p 75

⁷⁸ ibid



Image Page 36: © 2014 Erland Howden



SCL for about 2.5km (about 0.5% of its length).⁷⁹ Despite being forced to admit that, “Construction of linear infrastructure can fragment agriculturally productive soils characteristic of GQAL or Strategic Cropping Land,”⁸⁰ no area calculation of affected agricultural land was provided.

As a demonstration of the silence of the Queensland Government on the loss and fragmentation of agricultural lands in Central Queensland as a result of the expanding mining industry, in the 267 pages of the Queensland Coordinator-General’s evaluation report on Waratah’s Galilee Coal Project the word “agriculture” appears five times and “cropping” just eight. The 398 page Coordinator-General’s report on the Alpha Coal Project mentions agriculture nine times and cropping or crops only twice, though GVK Hancock at least included an agricultural land assessment in their EIS documents.⁸¹

The GVK Hancock rail project will result in direct sterilisation of about 2,200 ha of Good Quality Agricultural Land (GQAL) and a further 800 ha of other agricultural land.⁸² GVK Hancock identify the significance of the overall cumulative loss of GQAL as “moderate” in contrast to losing the opportunity to exploit and export Galilee Basin coal and “low” in relation to overall economic impact, as the proposed new land use will “offset” the economic losses of farmers.⁸³ GVK Hancock claims that for a large number of properties, the area of direct impact is minimal when compared with the total area of land held by the landholder and consulted with landholders to avoid or minimise the fragmentation of important finishing paddocks, along with areas of property infrastructure and improvements, such as cattle yards and dams.⁸⁴

GVK Hancock’s Alpha rail project will cross 38 properties, a number of which have multiple parcels of land directly impacted. The corridor width will generally be 60m, allowing space for the railway line infrastructure, maintenance roads and passing loops. Land acquisition is expected to be by easement in almost all cases. In their original EIS, GVK Hancock proposed that landholders would retain overall title to the land and agree to GVK Hancock’s use of the land within an easement for purposes relating to the Project with the possibility of special conditions and compensation payments.⁸⁵ The company admits that the rail line will have an impact on paddock use and access across these properties: “Most landowners use purpose built cattle laneways to efficiently move stock from various sections of their properties to central cattle yards. The Project may cross these laneways thus impacting on the ability of cattle to be moved efficiently; however they will be re-instated as part of compensation”.⁸⁶

Like GVK Hancock, Adani did undertake some assessment of land impacts for their projects. The proposed NGBR corridor traverses a total of 64 properties, more than half of which are freehold lots.⁸⁷ Development of the NGBR Project will directly impact approximately 3,248 ha of land across these 64 properties resulting in a permanent land use change for impacted areas. The NGBR proposal intersects a total of 1,669 ha of land classified as GQAL, Class A, B and C1. Within this area, 1,264 ha of GQAL will become sterilised due to the final rail corridor and permanent ancillary infrastructure and a further 405 ha will be sterilised due to temporary ancillary infrastructure.⁸⁸

Adani completed a desktop assessment to assess the potential SCL that will be lost to their Northern Galilee Basin rail line, including cropping history. A soil survey is yet to be undertaken or management plans prepared.⁸⁹ The company claims they will minimise impacts to areas of GQAL and SCL intersected by the final rail corridor.⁹⁰ Adani notes in their assessment that compensation packages relating to the permanent loss of land “are the subject of ongoing discussion and negotiations with affected landholders.”⁹¹

One property, Birralee, contains 17 ha of triggered SCL which has passed the History of Cropping Assessment test,⁹² 12ha within the final rail corridor, and 5ha within the “temporary ancillary infrastructure” footprint.⁹³

⁷⁹ Waratah Coal, 2012, p19

⁸⁰ Waratah Coal, 2012, p 23

⁸¹ QCG, 2012.

⁸² Hancock Prospecting, 2010f , p32

⁸³ op cit , p35

⁸⁴ Hancock Prospecting, 2010c, p11

⁸⁵ op cit, p10

⁸⁶ op cit, p12

⁸⁷ GHD, 2013f, p5

⁸⁸ GHD, 2013a, p 9

⁸⁹ op cit, p9

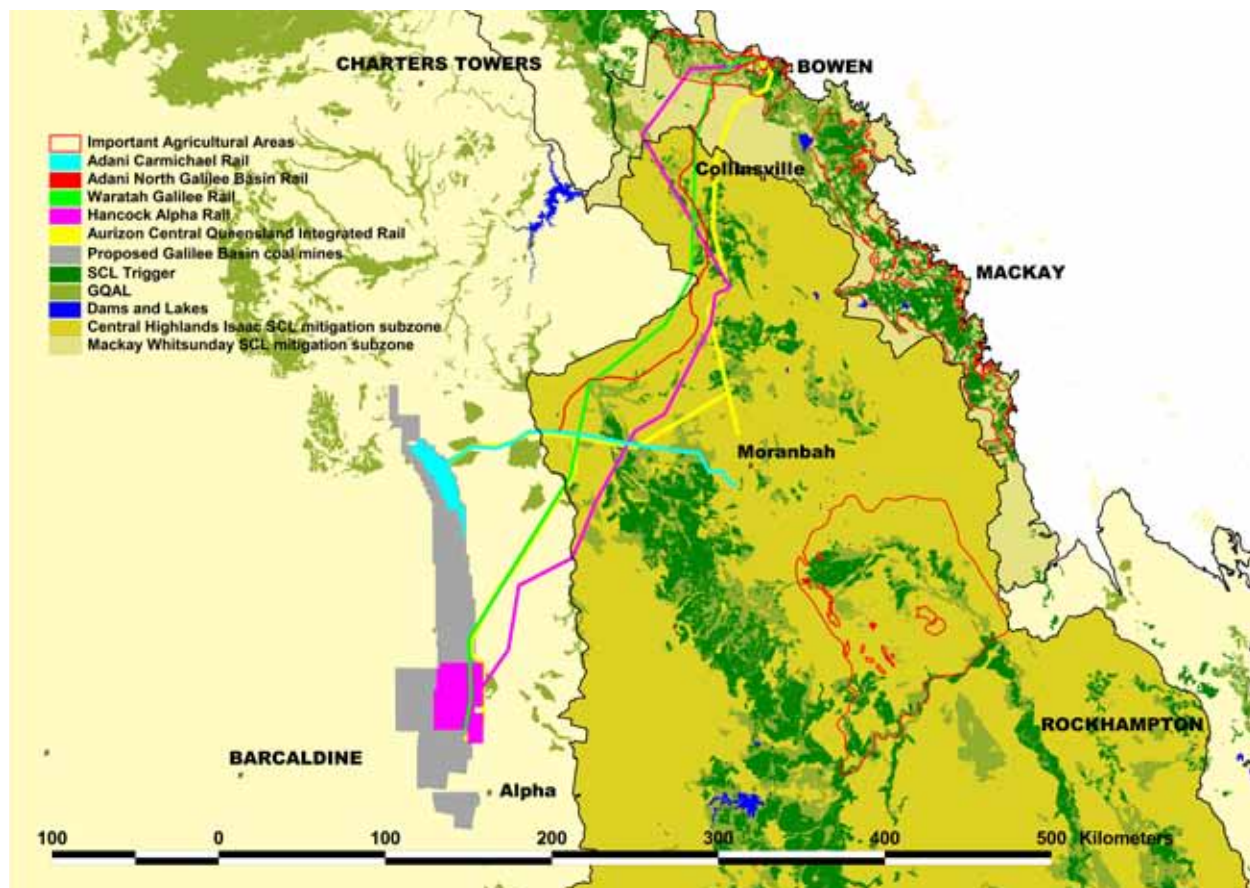
⁹⁰ GHD, 2013b, p36

⁹¹ GHD, 2013c, p40

⁹² GHD, 2013a, p9

⁹³ op cit, p42

Map 16: Important agricultural land in the GBSDA



Though the company has stated that it will pursue voluntary land access agreements or acquisition, it has also indicated its intention to pursue compulsory acquisition, an avenue that the new Galilee Basin State Development Area indicates the Government will facilitate.

Similarly, Adani's Carmichael Rail Project will fragment properties and affect stock movements, maintenance and access tracks, and decrease land values, usability and access to water on severed parcels.⁹⁴ The company's mapping indicates that, based on a 95m corridor, the Carmichael rail project will impact approximately 1,334 ha of GQAL. The company points out that 54 per cent of this is Class C1 land or pasture land classified as suitable only for improved or native pastures, but that means that 46 percent, or 613ha, is Class A or B land.⁹⁵

Adani claims that the potential impacts on GQAL have been avoided and minimised through route selection whereby GQAL constraints were considered, and that the Project alignment largely avoids land mapped as being Class A GQAL and attempts to traverse the outer extremes of Class B mapped areas to avoid and minimise fragmentation.

Adani go on the say that, "Potential impacts on strategic cropping land have been avoided and minimised through route selection" and that "Where mapped strategic cropping land is unable to be avoided, the route selection process has considered (amongst other environmental, social, cultural, economic and technical constraints), the placement of the rail corridor such that it traverses around or as close as possible to, the edges of polygons to minimise fragmentation."⁹⁷ Nevertheless, the assessment documents acknowledge that 120km of the Carmichael rail corridor traverses the western extent of the strategic cropping land Management Area in the western cropping zone,⁹⁸ capturing 155ha of land in the Strategic Cropping Land trigger map.⁹⁹

⁹⁴ Adani Mining, 2013a, p2

⁹⁵ Adani Mining Pty Ltd, 2012a, p54

⁹⁶ op cit, p47

⁹⁷ op cit, p56

⁹⁸ Adani Mining Pty Ltd, 2012a, p47

⁹⁹ Adani Mining Pty Ltd, 2013f, p iv

Many of the properties affected by Adani's Carmichael rail alignment are large landholdings, with the smaller landholdings tending to be near Moranbah. Adani claims that the alignment tends to follow property boundaries along these smaller landholdings, reducing the potential land fragmentation. The alignment traverses 11 leasehold properties and 10 freehold properties, while quarry developments affect five properties and these are predominantly grazing or pastoral properties.¹⁰⁰

Some landholders will have their property (or properties) split by projects which will, for some, necessitate new property management practices, during both construction and operation. Potential negative impacts on landholders and amenity include noise, dust, disrupted operations and increased fire risk, and the sterilisation of land for future use for food production.¹⁰¹

The company notes that the SCL Act offers alternatives to deal with strategic cropping land and while "financial contribution commensurate with the area of impact on all mapped potential strategic cropping land is a common and reasonable management approach to minimise potential strategic cropping land impacts", measures to further avoid or minimise potential impacts, rather than having to pay compensation, include developing and agreeing a soil survey methodology with the Department of Natural Resources and Mines to determine the actual presence of strategic cropping land prior to construction.¹⁰² Adani appear to be saying that assessing SCL out of existence is a common and reasonable management approach to minimise potential strategic cropping land impacts.

Nevertheless, a HoC assessment was undertaken on the six properties containing SCL in the Carmichael rail corridor: Avon Downs, Lambing Lagoon, Myra, Wentworth, Rugby and Rugby Run.¹⁰³ The assessment determined that only two of these properties contain SCL: Avon Downs (53.5 ha of SCL) and Lambing Lagoon (19.3 ha of SCL).¹⁰⁴

Adani have elected to accept the SCL trigger mapping for both Avon Downs and Lambing Lagoon, and will enter into discussions with the Department of Natural Resources and Mines (DNRM) prior to submitting the protection decision application.¹⁰⁵ No field verification of SCL is proposed to be undertaken.¹⁰⁶ Details on the impact type (permanent or temporary) will "have some bearing on total mitigation fee and rehabilitation requirements"¹⁰⁷ and a Deed of Agreement will be established between Adani and the Department of Agricultural, Fisheries and Forestry (DAFF) to facilitate mitigation of this loss.¹⁰⁸ Of course, the repeal of the Strategic Cropping Land Act has saved them from having to make even this minimalist amends for the loss of this land.

It is our contention that the Galilee Basin State Development Area and the Regional Planning Interest Act 2014 are inconsistent with Queensland's aspiration to double agricultural production by 2040. A slew of laws, plans and policies and a clutter of different approaches to categorising land as "good quality agricultural land," "strategic cropping land," and "priority agricultural areas" cannot disguise the abject failure of the current Government to develop policy that protects and promotes food lands and agricultural enterprises. If agricultural production really were a priority for the Government, there would be an unambiguous prohibition of development that sterilises food producing land, instead, the reverse is the case, more and more land is being lost in the Government's enthusiasm for mining development.

Under the measures foreshadowed by the Galilee Basin State Development Area, 252,439ha of Class A good quality agricultural land will be available for compulsory acquisition by the state or a private foreign company and its use as food producing land potentially lost forever. Moreover, the Galilee Basin Development Strategy proposes making water available to the mine proponents from the State reserve, and allowing them a discount on water licences that agricultural enterprises are required to pay for. The continued imbalance in the Government's policy approach, which privileges damaging mining activity and its infrastructure needs over other, long-established land uses in rural Central Queensland is leading to the irreversible loss of good quality land, and jeopardising the food producing future of the state.

¹⁰⁰ Adani Mining, 2013a, p 21

¹⁰⁸ Adani Mining, 2013a, p57

¹⁰¹ Adani Mining, 2013c, p33

¹⁰² Adani Mining Pty Ltd, 2012b, p57

¹⁰³ Adani Mining Pty Ltd, 2013f, p4

¹⁰⁴ Adani Mining Pty Ltd, 2013f, pv

¹⁰⁵ *ibid*

¹⁰⁶ Adani Mining, 2013a, p20

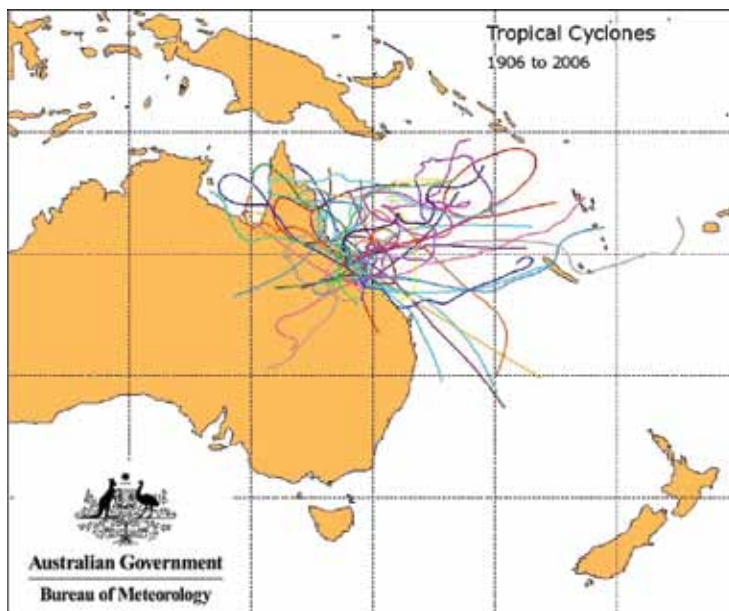
¹⁰⁷ Adani Mining Pty Ltd, 2013f, piv

5. Queensland floods

Queensland has one of the most naturally variable climates in the world and its climate is projected to become more variable and extreme in the future, potentially affecting the frequency or severity of natural hazards, particularly floods.

Map 18 shows the five rail proposals in the Galilee Basin State Development Area and the floodplains traversed by them. Assessments produced so far for the rail projects have had mixed degrees of attention to detail about the potential impacts of flooding on surrounding farmland, and the degree to which the railways will exacerbate or alter flooding effects in the region. The variable rainfall and relatively flat topography over most of the GBSDA area can result in localised and widespread flooding in floodplains throughout the length of the catchments during rainfall events of more than 200 mm over a 48 hour period. Flooding generally occurs during summer months as a result of heavy rainfalls caused by tropical lows and rain depressions generated from cyclones crossing the north eastern Queensland coastline.¹⁰⁹

Map 17: Screen shot from BOM Tracks of East Australian Tropical Cyclones 1996-2006



Based on historical data, a total of 57 tropical cyclones have passed within 200 km of the North Galilee Basin Rail Project study area since 1906, as shown in Map 17.¹¹⁰ These cyclones mostly reached intensities of Category 1 to Category 3, however, most developed into a low by the time they made landfall. One of the most powerful tropical cyclones recorded in Queensland was Yasi, a Category 5 cyclone, which made landfall near Mission Beach more than 200 km north of Abbot Point.¹¹¹

In January and February 2008, Cyclone Helen caused significant rainfalls throughout the region. These falls resulted in a number of the rivers and creeks in the region overtopping their banks, including the Bogie River. Flooding occurred at a number of isolated sites along Bogie River between Charters Towers and Clermont, which includes areas in the vicinity of the proposed railways. This type of event is characteristic of the region where intense rainfall can result in localised flooding of a number of the river and creek systems. Similar conditions were observed in March 2010 following Cyclone Ului that traversed directly over Collinsville as a Category One system.¹¹²

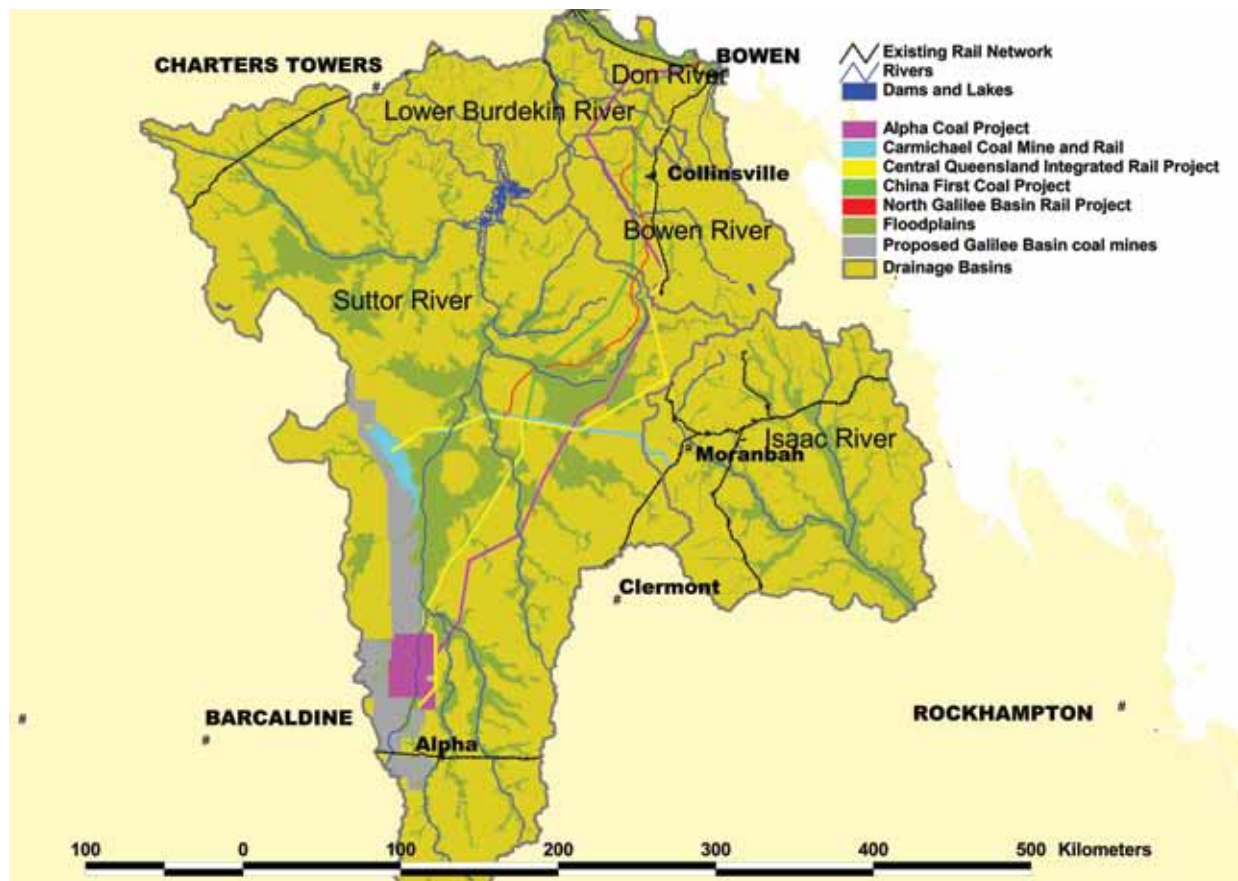
¹⁰⁹ Waratah Coal, 2011c, p369

¹¹⁰ BOM, 2013a

¹¹¹ BOM, 2013b

¹¹² Waratah Coal, 2011c, p369

Map 18: Proposed rail lines and floodplains



Queensland’s State Planning Policy 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide sets out the State’s interest in ensuring that the natural hazards of flood, bushfire, and landslide are adequately considered when making decisions about development, and addresses development issues associated with minimising the potential adverse impacts of flood, bushfire and landslide.¹¹³ The SPP 1/03 requires the identification of natural hazard management areas. A natural hazard management area for flood is land inundated by a Defined Flood Event (DFE) and identified in a planning scheme.

Section A3.2 of SPP 1/03 states, “The Queensland Government’s position is that, generally, the appropriate flood event for determining a natural hazard management area (flood) is the 1% Annual Exceedance Probability (AEP) flood. However, it may be appropriate to adopt a different DFE depending on the circumstances of individual localities. This is a matter that should be reviewed when preparing or undertaking relevant amendments to a planning scheme.” Section A4.2 sets out the SPP Guidelines on how outcomes should be achieved for development to be compatible with floods:

¹¹³ <http://www.dsdp.qld.gov.au/resources/policy/spp-ifbl.pdf>

1. Development maintains the safety of people on the development site from all floods up to and including the DFE.
2. Development does not result in adverse impacts on people's safety or the capacity to use land within the floodplain.
3. Development minimises the potential damage from flooding to property on the development site.
4. Public safety and the environment are not adversely affected by the detrimental impacts of floodwater on hazardous materials manufactured or stored in bulk.
5. Essential services infrastructure (e.g. on-site electricity, gas, water supply, sewerage and telecommunications) maintains its function during a DFE.

This report maintains that none of the rail corridor projects proposed for the GBSDA comply with Queensland State Planning Policy 1/03. Of course, as a measure taken under the State Development Public Works Organisation Act, the policies of the Sustainable Planning Act do not apply to these projects. And yet, it is curious that the Government should adopt less stringent hazard reduction and assessment measures for major pieces of infrastructure that have extensive impacts along a 500km long corridor than are applied to local government when making decisions about building sheds on the same floodplains.

5.1 GBSDA flood impacts

The construction of multiple rail lines in the region has the potential to create significant flood impacts and fragment and diminish valuable farmland. If all five duplicate rail lines are built from the Galilee Basin to Abbot Point and Hay Point, the cumulative impacts would be unacceptable.

However, it is generally agreed, including among GBSDA rail project proponents, that it is unlikely all these proposals will be completed. The Queensland Government in 2012 stated its preference for two rail lines to be built, one "north-south" line, for which a combined project between GVK Hancock Coal and Aurizon appears the favoured contender, and an "east-west" line, which will presumably be one of the Adani projects. Nevertheless, any one of the five proposals will have an impact on existing and potential agricultural productivity, due to the fragmentation of land use and the numerous crossings of roads, stock routes and waterways that a new rail line will need to make. As many extensive floodplains are crossed by the GBSDA, as shown in Map 18, the intensification of flood impacts is unavoidable. Should any one of these projects proceed to completion, substantial mitigation of flood impacts and significant compensation provisions would be required before landholders affected by them can be satisfied.

Land owners along the railway line have repeatedly voiced concerns about the impact the lines will have on flood regimes, and have engaged in detailed analysis of the assessment documents for the Alpha rail line particularly. This has forced some companies to promise to address these concerns and yet, our investigations indicate that there is still a great deal of risk involved with the construction of these railways, and the proponents have not been made to locate them away from floodplains or design them according to best practise and precautionary guidelines.

As shown in Map 18, four major Central Queensland river systems are crossed by the GBSDA – the Bogie River, the Bowen River, the Suttor River and the Belyando River, all in the greater Burdekin catchment. Twelve major dams and weirs occur along the four major Queensland Rivers that are crossed by the GBSDA.¹¹⁴

¹¹⁴ QCG, 2012. p107

Table 9: Stream crossings by rail projects by stream order (Strahler 1957)

| Stream Order | GVK Hancock Alpha Rail | Aurizon CQIR | Waratah China First Rail | Adani NGBR | Adani Carmichael Rail | Total | GBSDA pre-cincts |
|--------------|------------------------|--------------|--------------------------|------------|-----------------------|-------|------------------|
| 1 | 448 | 299 | 376 | 245 | 64 | 1368 | 856 |
| 2 | 192 | 160 | 161 | 106 | 27 | 619 | 431 |
| 3 | 112 | 86 | 92 | 42 | 20 | 332 | 196 |
| 4 | 75 | 49 | 43 | 23 | 2 | 190 | 118 |
| 5 | 76 | 22 | 9 | 8 | 4 | 115 | 65 |
| 6 | 38 | 15 | 10 | 6 | 2 | 69 | 14 |
| 7 | 2 | 2 | | | | 4 | 1 |
| 8 | | 3 | 1 | | 2 | 4 | 3 |
| Totals | 943 | 636 | 692 | 430 | 121 | 2822 | 1684 |

Source: GeoScience Australia, 2010. 1:100,000 drainage network of Queensland. Licensed under Creative Commons - Attribution 3.0 Australia
 Note: Aurizon CQIR includes existing rail corridor

Table 9 is an analysis we have undertaken of stream crossings, using the available rail alignment data and Geosciences Australia drainage data.

Adani's Carmichael Rail Project assessment documents state that the proposed rail alignment crosses twelve major waterways and 76 minor waterways. The waterway crossings will be either bridges or culverts or a combination of both, depending on the predicted depth of the water, but will predominantly be culvert only.¹¹⁵ The company's NGBR Project would require an astounding 567 waterway crossings,¹¹⁶ 196 of which require special consideration under the Queensland Water Act (2000) and Fisheries Act (1994).¹¹⁷ It would also cross seven national stock routes.¹¹⁸ The entire 307km of the NGBR corridor is proposed to be fenced: the single mitigation measure to protect adjacent stock is a four-strand barbed wire fence, with the added possibility of some exit-only gate mechanisms that allow stock to escape the rail corridor.¹¹⁹

Most of the length of the GBSDA is flood-prone, with nine floods experienced in the Burdekin catchment in the 50 years from 1958 to 2009,¹²⁰ and five major and 11 medium flood events experienced in the Don River Catchment in the 40 years since 1970.

GVK Hancock Coal, however, claimed in the original EIS for the Alpha rail line that, "The risk to the overland flow and flood impact of the rail line was classified in the EIS as insignificant."¹²¹ While GVK Hancock claimed that its proposed Alpha rail project was not expected to contribute significantly to cumulative impacts on surface water resources¹²² the company did identify the broad potential impacts to surface water from the construction and operation phases of the Project:

- increased sediment load in runoff;
- stormwater discharge and flow redirection;
- construction water use; and
- hydraulic impacts.

GVK Hancock concluded, however, that "With design, construction and operation measures in place, impacts on water resources are not expected."¹²³

¹¹⁵ Adani Mining, 2013a, p33

¹²¹ Hancock Prospecting, 2010b, Table 24.7

¹¹⁶ GHD, 2013b, p58

¹²² Hancock Prospecting, 2010b, p40

¹¹⁷ GHD, 2013h, p18

¹²³ Hancock Prospecting, 2010d, p2

¹¹⁸ GHD, 2013b, p54

¹¹⁹ GHD, 2013b, p58

¹²⁰ Hancock Prospecting, 2010b, Table 24.7

Adani claims in its EIS for the North Galilee Rail Project that though the project “has the potential to alter the characteristics of the flooding regime within the study area” the “extent of these changes in the vicinity of existing infrastructure (including homesteads and roads) is predicted to be within acceptable levels”¹²⁴. This indicates a disregard of the impacts that floods have on pasture and cropland, which may be far away from homesteads and roads, but nevertheless constitute the livelihood of agricultural and rural industries in the productive floodplains of Central Queensland. Adani admits elsewhere that the construction and operation of their Carmichael rail project may alter overland water flow and increase flood height and duration. Afflux has the potential to impact pasture species and facilitate weed invasion. Afflux may also erode or otherwise degrade soil. Infrastructure across a floodplain like roads and farm tracks may be severed or degraded by flooding.¹²⁵ It is these impacts on farmland and grazing land that may dramatically alter the character of the region if these rail lines go ahead.

Waratah Coal admits that “It is likely that the filling within the floodplain required for the creation of the railway embankment and the crossings of the major waterways and associated infrastructure will impact on flood behaviour”.¹²⁶ Waratah identifies these impacts as including “scour” in the immediate area of the crossing locations and changes to flood afflux levels both upstream and downstream of the rail crossing as a result of either the railway embankment or impacts associated with drainage structure design.¹²⁷

5.1.1 Drainage design

Australian Rainfall and Runoff (ARR) is a national guideline document for the estimation of design flood characteristics in Australia, published by Engineers Australia. The current 1987/1999 Edition is now being revised. The revision process includes 21 research projects, which have been designed to fill knowledge gaps that have arisen since the 1987 edition. It is therefore curious that this important guideline document does not appear in any of the reference tables of any of the assessment documents for rail projects in the GBSDA.

The design of adequate drainage to avoid the serious consequences of magnifying flood impacts is complex and any transport corridor that proposes to cross such vast floodplains as does the GBSDA needs careful consideration.

Operation of the NGBR Project for example requires 567 waterway crossings structures summarised in Table 10 that have the potential to impact existing surface water flows and hydrology and indeed existing flood inundation durations.

Table 10: Adani’s NGBRP waterway crossings and proposed works

| Total Waterway Crossings | | 567 |
|--------------------------|---|-----|
| Watercourses | | 196 |
| | Bridge Structures | 17 |
| | Drainage Structures (Pipe and Box Culverts) | 170 |
| | Diversions | 9 |
| Drainage Features | | 371 |
| | Drainage Structures (Pipe and Box Culverts) | 371 |

As discussed above, in the Burdekin River catchment rapid runoff and channel floodplain configuration lead to very fast flood-wave speeds that have been calculated up to 4.34 m s⁻¹, or about 14.4km per hour.¹²⁸ Flood water levels fall quickly, by metres in a single day, and flow is diverted away from raised areas of the river bed into subchannels.¹²⁹

¹²⁴ GHD, 2013a, p 13

¹²⁵ Adani Mining Pty Ltd, 2013d, p77

¹²⁶ Waratah Coal, 2011c, p386

¹²⁷ ibid

¹²⁸ Alexander et al, 1999

¹²⁹ ibid

Adani's Hydrology and Hydraulics Report for their North Galilee Rail Project proposes a design methodology for scour protection for abutments and piers based on the average flow velocity of 2.5 m/sec in bridge openings. Further, the outlet velocity for culverts is proposed to be restricted to 2.5 m/s for the design flood event protection with a factored velocity & flow in the range & 2.6 to 2.9 m/s.¹³⁰ While this is in accordance with Austroads (1994) Waterways Design Manual for scour protection,¹³¹ it fails to take into account the high flood flow velocities experienced in the Region and will therefore likely not meet Adani's stated flood inundation duration criteria.¹³²

In the absence of a nationally recognised drainage design guideline for railways, the Queensland Coordinator General recommended that Waratah Coal have regard to procedures in the Department of Transport and Main Roads Road Drainage Design Manual and best practice railway design for cross drainage design criteria and conform to the design criteria set by the Coordinator-General for the Alpha Coal Project.¹³³

Condition 19 of Appendix 4 of the Queensland Coordinator-General's report for the Alpha project purports to satisfy the community that flood impacts associated with the rail line on lands, improvements and infrastructure will be assessed and rectified by the proponent, guaranteed via a bond.¹³⁴ Unfortunately, the bond sought for damage audits and compensation from the proponent is a mere \$200,000 and the investigation and rectification of any damage is limited to 500m from the rail line.¹³⁵ Any damage inflicted beyond that point will not even be looked at by the company, let alone rectified or compensated for. This will do little to satisfy community and landowner concerns that the additional flood impacts that the rail line may cause to their lands, infrastructure and livelihoods will be adequately compensated for by the rail proponent.

Most of the issues that landowners have had with the proposals for the Galilee Basin railways have not been adequately addressed in any modelling or analyses to date. These include the possibility that rail lines will block stock from reaching dry ground in times of flood, unknown impacts on surrounding lands caused by floodwater overtopping rail lines, the rail line blocking floodwater from filling dams, thereby depriving stock of water, and the likelihood of blocked culvert pipes causing impacts during floods and potential cumulative impacts of the duplication of rail lines.¹³⁶



Image Page 46: ©TomJefferson/Greenpeace

¹³⁰ GHD, 2013h, p34

¹³¹ ibid

¹³² op cit, p 36

¹³³ GHD, 2013f, p183

¹³⁴ QCG, 2012, p152

¹³⁵ op cit, p354

¹³⁶ QCG, 2012, p15

Drain blockages

The EIS for Adani's NGBR project discusses possible hazards that might be associated with the occurrence of an extreme rainfall event. One hazard is described as: "Severe wet weather event resulting in significant stormwater runoffs/ flows." The likelihood of this event occurring is described as "Likely" and the potential impacts are described as: "Moderate." These impacts include:

- The embankment has the potential to be damaged by water flowing over the embankment.
- Blocked relief drainage due to debris.
- A major rain event could flood and washout the rail infrastructure resulting in disruption to transport of coal.¹³⁷

In our view, this would appear to the reasonable observer to be a "Severe" event rather than a "Moderate" one, as an artificial flood would be created upstream of the embankment at a level equivalent to that of a 1 in 100 year flood plus a margin for the depth of water over the line. The EIS is silent on these hazards to landholders and therefore offers no remedy to compensate landholders for any potential losses associated with overtopping of the railway line.

None of the four proponents of rail lines in the GBSDA have adequately addressed the impact of blocked culverts by flood debris and the impacts associated with drainage failures. No matter how sophisticated the flood modelling, without accepting that culverts and drainage structures block with debris during floods, they are of little value in interpreting flood behaviour. Experience indicates that there is a high probability that culvert and bridge openings will block during large storm events.¹³⁸ Blockage in drainage systems can cause significant problems such as increasing water levels, inundating neighbouring properties, overtopping roads or railways, damaging infrastructure and increasing maintenance costs.¹³⁹

Floodplains generate materials representative of the catchment geology, such as boulders, cobbles and gravels. A range of finer sediment types can be sourced from all land uses. As this material is mobilised and transported downstream it either passes through hydraulic structures that it encounters, or it does not. When it does not pass through a structure, it may cause a blockage of that structure and a subsequent modification of the hydraulic capacity of that structure. When severe, this blockage has the ability to divert flow to areas that are not usually subject to flooding, and can significantly alter flood levels and flow paths in the vicinity of the structure. The subsequent risk to life from structure blockage is considerable, as is the damage diverted flow can cause. Blockage is a concern at all scales of structures from minor inlets in urban drainage systems up to large culverts and bridges.¹⁴⁰

Engineers Australia's Australian Rainfall And Runoff Revision Project described the guidance provided by existing guidelines and manuals as "incomplete, inconsistent and unclear," and says that, as a result, "designers and managers of drainage infrastructure are unsure of the most appropriate approach to adopt for the treatment of blockage and it is therefore likely that designs may be insufficient." The likelihood and impacts of blockages can in some cases be reduced through appropriate planning and design of hydraulic structures. However, "these impacts can only be mitigated if drainage structures are of sufficient capacity to cope with the anticipated debris".¹⁴¹

In all structures, consideration should be given to maintenance procedures, even without an allowance for blockage. However because blockage increases the requirement for maintenance, it is especially important when considering this factor. Appropriate consideration must therefore be given to how maintenance personnel gain safe access for inspection and maintenance purposes, including safe machinery access to remove debris blockages.¹⁴²

¹³⁷ GHD, 2013i, p5

¹³⁸ Rigby et al., 2002

¹³⁹ Engineers Australia, 2009

¹⁴⁰ Engineers Australia, 2009

¹⁴¹ op cit, p52

¹⁴² ibid

Four modes of blockage have been identified:

- Progressive build-up of sediment, scoured from upstream bed and banks, in the barrel of the culvert. This blockage typically developed from the bottom up, and in cases of partial blockage, only the lower part of the culvert was affected.
- Initial blockage by large items of floating vegetation, such as trees or parts of trees. This material then provides support for smaller vegetation, such as shrubs and grasses. Vegetation debris came from collapsing banks or adjacent overbank areas, and typically blocked the culvert from the top down.
- More abrupt blockage by urban materials, including refuse, building materials, fences and sheds, which are swept into streams by overland flows and by streams breaking their banks.
- Less common circumstances where a large item, such as a motor vehicle or shipping container suddenly and totally blocks the culvert opening. Larger items such as the shipping container are even able to block the larger openings of bridges.

Waratah admit in its EIS that for waterways crossed by their rail proposal that are well defined with significant flooding depths and velocities such as the Elliott, Bogie, Bowen, Upper Suttor Rivers and Pelican Creek, some impact on peak flow rates during flooding events will occur if significant debris build up results in partial blockage of the structure during a flooding event. The company admits that blockage of the bridge structures is likely to occur to some extent given the surrounding natural environments at many of these crossings and that blockages of bridges can also lead to increased flood levels upstream, and impacts on the timing of floodplain peaks within the overall drainage basins.¹⁴³

Waratah states that the impact for these crossings is dependent on the incorporated flow capacity of each structure, and the extent of earth embankment encroachment into the floodplains.¹⁴⁴ They go on to say that it is likely that increased scour potential will occur around and through the area around the culvert and increased water levels (and depths) upstream of the railway will occur, with a reduced water level downstream of the embankment. Accordingly, impacts on flow transference will occur, possibly resulting in reduced peak flow rates downstream of the rail embankments.¹⁴⁵ This may impact on timing of peak flood levels in regions further downstream in the respective drainage sub basins.¹⁴⁶

In major storms it is not uncommon for structures to back up flow to the point that an overland flow path develops, causing flows contained within one stream to divert away from their previous alignment. This diverted flow may eventually return to the same stream or discharge into an adjacent stream. Blockages have the potential to increase both the frequency of occurrence and magnitude of such diverted flows.¹⁴⁷ Even small blockages can create diversions that would not exist (even in major events) and can considerably change flood behaviour.¹⁴⁸

Engineers Australia suggest that to minimise the potential for 100% debris blockage of a culvert at water crossings, the minimum desirable cell height is 3m, and the minimum desirable cell width is 5m, which are significantly smaller than the dimensions recommended for Wollongong, where a minimum dimension of 6 m has been suggested.¹⁴⁹

In contrast to this recommendation from Engineers Australia, Adani's Hydrology and Hydraulics Report for the North Galilee Rail project proposes that engineered culverts have minimum internal opening of just 900mm.¹⁵⁰ This size would be inadequate in any situation but is grossly insufficient in an area of such flooding intensity as the Burdekin and Don River catchments. Clearly, poor analysis and planning in this instance could lead to poor disaster management, and it will be the landholders and communities of the floodplain that will feel the effects of this failure.

Adani proposes a combination of bridges, pipe culverts, and box culverts for their crossings. Bridges are proposed at locations with design flow rate greater than or equal to 250m³/s, major culverts at locations with design flow rate greater than or equal to 50m³/s and minor

¹⁴³ Waratah Coal, 2011a, p386

¹⁴⁴ Waratah Coal, 2011a, p386

¹⁴⁵ ibid

¹⁴⁶ ibid

¹⁴⁷ Rigby and Silveri, 2001.

¹⁴⁸ ibid

¹⁴⁹ Engineers Australia, 2009, p52

¹⁵⁰ GHD,2013h, p33

culverts for locations with design flow rate less than 50m³/s.¹⁵¹

As discussed above, floods of the Burdekin rise abruptly, reaching peak discharges of up to 40,000 m³s in less than 24 hours and they can maintain peak flow for up to a few days, and then recede exponentially.¹⁵² Sediment transport measured during a flood peak of 11,155 m³s⁻¹ in February and March 2000 found that about 3.7×10⁶ tonnes of suspended sediment and 3×10⁵ tonnes of bedload was estimated to have been transported past the sample site during the event. Bedload transport rate and changes in channel shape were greatest several days after peak discharge.¹⁵³

Blockage by sediment typically occurs both in the culvert entrance and along the barrel of the culvert, whereas the other three blockage modes typically block the entrance only.¹⁵⁴

Sedimentation within culverts may be managed using one or more of the following activities:

- formation of an instream sedimentation pond upstream of the culvert;
- formation of a multi-cell culvert with variable invert levels such that the profile of the base slab simulates the natural cross section of the channel;
- installation of sediment training walls on the culvert inlet.
- Sediment training walls reduce the risk of sedimentation of the outer cells by restricting minor flows to just one or two cells.¹⁵⁵

It is strongly recommended that GBSDA rail proponents design drainage structures in accordance with the Australian Rainfall & Runoff Revision Project 11: Blockage of Hydraulic Structures, since it is clear that the current approach is not commensurate with the scale and risk of floods in the Burdekin catchment.

Flooding inundation duration

Most affected landowners stated in submissions on the Alpha rail proposal that they would not accept the validity of GVK Hancock's flood model unless it reproduced known historical flood behaviour. In other words, they wanted assurance that the model that GVK Hancock was using to analyse the flood risks and impacts of their project, and the Government was using to assess those impacts and evaluate the project, actually matched the known flood history of the area. The Queensland Coordinator General dismissed these concerns, stating that ground-truthing and rerunning the models where they do not replicate historical data would be expensive and time consuming.¹⁵⁶ Instead, a condition of approval was imposed that further flood modelling validation be undertaken during the detailed design phase.¹⁵⁷

While GVK Hancock has set a design criteria that flood inundation duration over existing infrastructure and assets should not exceed 20% of existing flood duration conditions during the 50 year ARI design event,¹⁵⁸ no actual flood inundation duration modelling has been completed so there is no way of knowing if this criteria can and will be met.

Adani's Hydrology Project Design Criteria for the North Galilee Project similarly stipulates that, "Any increase in duration (modelled) of flooding inundation is not to exceed an average across the modelled extent of 72 hours or 20% (whichever is greater) of existing inundation durations during the 50 year ARI event. This is unless specific circumstances where inundation durations post-development can be tolerated in conjunction with landholder agreement" (our emphasis)¹⁵⁹.

None of the proposed rail projects have undertaken flood inundation duration modelling. These will only be undertaken at the detailed design phase.¹⁶⁰ It is unacceptable that such important modelling is left until after public consultations have been completed with affected landholders and approvals given for construction. Landholders should rightly be concerned that flood inundation duration caused by any of the rail alignments can meet stated design criteria and will be accurately described in any modelling undertaken by the proponents.

¹⁵¹ GHD, 2013b, p56

¹⁵² Fielding, and Alexander, 1996

¹⁵³ Amos et al, 2004

¹⁵⁴ Rigby et al, 2002

¹⁵⁵ Engineers Australia, 2009, p58

¹⁵⁶ QCG, 2012, p15

¹⁵⁷ ibid

¹⁵⁸ ibid

¹⁵⁹ Adani Mining Pty Ltd, 2013d, p23

¹⁶⁰ Adani Mining Pty Ltd, 2013e, p21 and 23

Afflux

Afflux is the rise in the water level immediately upstream of and due to a natural or artificial obstruction. Another definition is the maximum difference in water level, at a location upstream of the structure, if the structure were removed.

Adani admits that introducing permanent drainage infrastructure along or across an existing waterway will alter existing drainage patterns in the short-term, leading to temporary changes in afflux upstream of the flow path.¹⁶¹

Designing afflux criteria is a balance between cost and effectiveness. In Adani's words: "achieving afflux design criteria is a process that seeks to achieve a balance between minimising the impacts of afflux and achieving a practical and cost effective design. Some amount of afflux is unavoidable due to the proposed structures, and infrastructure assets in the floodplain such as roads and farm tracks, will most likely be affected by any increased depth and duration of flooding."¹⁶²

GVK Hancock's EIS initially proposed afflux to be limited to 1.5m from the rail line, which the Queensland Coordinator General concluded was excessive and had the potential to cause significant upstream impacts, changes to overland flow directions, high velocities through culverts, erosion downstream of culverts and very high potential for wash-out of the embankment when overtopped.¹⁶³ The Queensland Coordinator General suggested that the culvert outlet velocities of 5m/s implied a high afflux that would require significant downstream erosion protection.¹⁶⁴

Submissions to the GVK Hancock's Alpha Coal Project highlighted several deficiencies in the original design criteria maximum values for culvert outlet velocity, and culvert and bridge design afflux suggesting that those outlined are too high and would result in the following:

- Potential excessive scour through and downstream of the structure - high velocities will require extensive rock protection;
- Potential decrease in flood immunity of structures upstream of the alignment;
- Potential changes in flood flow patterns and flooding behaviour across floodplains;
- Potential extensive damage to railway formation (washouts) when overtopping occurs during a flood event that exceeds the design event, because of the large differences in headwater and tailwater at the time of overtopping.¹⁶⁵

The landholders recommended maximum culvert outlet velocity and afflux of 3m/s and 0.5 m respectively.¹⁶⁶

The Queensland Coordinator General requested a detailed floodplain study which resulted in a revised design that incorporated sufficient cross-drainage infrastructure to achieve a maximum projected afflux of 0.5m, even though a theoretical maximum of 0.3m was achievable. The revised design criteria meets the criteria set for it, that there be no major increases in area of inundation of no more than three day duration and maximum velocity of 1.5m/s for erodible soils; 1.2 times existing velocities at bridge outlets and 2 .5m/s at culvert outlets.¹⁶⁷

According to the Coordinator General's report, the maximum 0.5m afflux can be adjusted in limited circumstances and, confirmation that the design criteria will actually be met will not be known until a more detailed review of the proposed cross drainage is made during the design stage.¹⁶⁸ Despite the project being approved and apparently going ahead, the affected landholders still have no certainty about the degree of afflux and flow-on impact this will have in their land and businesses.

¹⁶¹ GHD, 2013d, p40

¹⁶² GHD, 2013d, p41

¹⁶³ QCG, 201 2, p149

¹⁶⁴ ibid

¹⁶⁵ QCG, 2012, p150

¹⁶⁶ ibid

¹⁶⁷ ibid

¹⁶⁸ ibid

Adani's Hydology and Hydraulic Report suggests that, "With the recommended waterway drainage structures, afflux levels adjacent to the proposed railway generally meet the maximum design criteria of 0.5m. Afflux and velocity results for the post development case meet the nominated design criteria requirements at all critical locations. It has been shown that the use of drainage structures along the proposed railway can mitigate its hydraulic impacts to acceptable level."¹⁶⁹ As for the Alpha and Adani rail projects, a number of submissions were received from landowners and community groups during Waratah's EIS public consultation stage concerned that the rail line would exacerbate flooding impacts particularly for upstream landowners. These concerns typically centred on:

- increased extent of flood inundation through afflux (increase in flood height arising from a reduced waterway area at the railway cross drainage structure);
- the rail line blocking access for stock in reaching high ground during flooding events.
- prolonged inundation times
- changes in connectivity to overland flow patterns that may adversely impact property management and the filling of farm dams.¹⁷⁰

While Waratah has set an upper limit on afflux at 0.5 m, they haven't even set a limit for extended inundation times which, as the Coordinator General pointed out, "is likely to be a sensitive issue for landowners where valued pasture or agricultural lands are involved"¹⁷¹. Despite this failure, this project, too, has achieved approval from the Queensland Coordinator General.

The engineering designs for all the proposed rail projects fail to take into account any potential cumulative impacts of afflux associated with Queensland Rail or road drainage within close proximity to the proposed rail line or blocked drainage works. The most important details of flood mitigation for these major rail projects have been left out of assessment documents, with promises that they will be investigated at the detailed design stage, once approvals have been provided,¹⁷² a situation that hardly instils confidence that the Government is ensuring the future of the agricultural industries of Central Queensland is being given as much attention as the future of the coal industry.

¹⁶⁹ GHD, 2013h, p38

¹⁷⁰ QCG, 2013, p87

¹⁷¹ QCG, 2013, p88

¹⁷² Hancock Coal, 2011e, p3



Image Page 52: Paula Heelan



5.1.2 Average Recurrence Interval

The companies involved in proposing the Galilee Basin rail lines are not planning to withstand the kinds of major flooding events that will almost certainly be visited upon the areas impacted by the rail lines over the life of the infrastructure. An Average Return Interval (ARI) is the average length of time between two floods of a given size or larger. Another name for ARI is the return period. A one-in-100 year flood would be expected to occur, on average, once in every 100 years. Contrary to popular understanding, an ARI tells us how likely a flood is, but says nothing about when it will actually come. Thus a 1-in-100 year flood might occur this year, next year, several times or not at all during our lifetime. But, on average, it will occur once every 100 years.¹⁷³

Of greater concern is the Queensland Coordinator General's recommendation to GVK Hancock that prior to construction a report be submitted setting out flood passage and drainage associated with the railway for flood inundation duration and culvert velocities for 50 year ARI events comparing current and developed conditions.¹⁷⁴ These detailed designs should be inherent to the assessment documents lodged for approval and any drainage criteria should provide at least one in 100 ARI flood immunity. Indeed, the approved drainage design criteria for GVK Hancock prescribes only 1:20 ARI flooding for minor culverts, scour protection, unlined diversion and cut-off drains.¹⁷⁵

As shown in Table 11, Adani proposes providing different levels of flood immunity for different infrastructure. Adani proposes to provide a 1:100 ARI immunity against the rail being overtopped by floodwaters, but only a 1:50 ARI flood immunity for everything else, including major road inundation and not even then if an appropriate statutory body specifies some other level. Similarly, their drainage design is proposed to be for 50 year ARI flows for major bridges and culverts, isolated minor culverts and diversional drainage, but for other minor culverts and longitudinal drainage only a 20 year ARI flow of <50m/s is proposed.¹⁷⁶ For minor roads, only a 1:10 ARI immunity is provided for, which is meaningless.

Table 11: Adani's design criteria for avoiding flood impacts on infrastructure

| Design Aspect | Design Criteria |
|--------------------------------|--|
| Lowest edge of formation level | 50 year ARI plus 300mm |
| Top of rail | 100 year ARI flood immunity |
| Major road crossings | 50 year ARI flood immunity or as specified as appropriate statutory body |
| Minor road crossings | 10 year ARI flood immunity or as specified as appropriate statutory body |

Source: Adani Mining Pty Ltd, 2013g, p18

Adani's Hydrology and Hydraulic Report for the North Galilee Rail Project suggests that about 371 minor drainage features will be required. If half of these are isolated and therefore designed for 50 year ARI flood, 180 minor culverts will be installed that are only designed for a one in 20 year ARI flood. The theoretical failure rate of any one of these culverts over the 90 year lifetime of the project is about 800 or 10 times a year. There is a 40% chance over any ten year period, and a 64% chance over any 20 year period, that the design flood (1:20 ARI) will be exceeded.

¹⁷³ José, 1993

¹⁷⁴ QCG, 2012, p354

¹⁷⁵ Calibre, 2011a, b, c and d, p 7

¹⁷⁶ GHD, 2013h, p3 - 4

Table 12: Catchment sizes and NGBRP waterway classification and the number of proposed crossings

| Catchment size | Classification | Waterways | Water courses | Drainage features |
|---------------------------|----------------|-----------|---------------|-------------------|
| <=25km ² | Minor | 543 | 172 | 371 |
| >25km<=100km ² | Moderate | 11 | 11 | 0 |
| >100km ² | Major | 13 | 13 | 0 |
| TOTAL | | 567 | 196 | 371 |

Source: GHD, 2013h, p19

Adani propose installing 16 bridges and major culverts designed to withstand one in 50 year ARI flood levels.¹⁷⁷ The failure rate of any one of these culverts over the 90 year lifetime of the Carmichael mine will be about 30 times, or about once every 3 years. The chance of the design flood of ARI of 1 in 50 being exceeded during the life of the project (90 years) is 84%. These are not odds that inspire confidence in the drainage design protecting the community, assets infrastructure and farm productivity.

Similarly, GVK Hancock's drainage structures are only required to provide a 1 in 50 year flood immunity to the top of the rail formation for major drainage lines and 1 in 20 year immunity for minor drainage lines.¹⁷⁸ GVK Hancock's Drainage Report estimates that over the 30 year life of Alpha and Kevin's Corner mines, there is a 45 per cent chance that the 50 year flood ARI will be exceeded and a 78 percent chance that the 20 year flood ARI will be exceeded.¹⁷⁹

Waratah state that they will design culverts sufficient to prevent over topping in a one in 50 year ARI peak flow outside of floodplains and a 1 in 100 year API for culverts placed within floodplains¹⁸⁰, and maximum velocities at bridges are designed not to exceed existing velocity by more than 20%¹⁸¹. Waratah advises that the adopted cross drainage design approach is consistent with the DTMR Road Drainage Design Manual.¹⁸²

Drainage design for rail lines must provide flood immunity for at least a 1:100 ARI flood. The high failure rates inherent in drainage features designed for less than 1:100 ARI floods will of course not necessarily lead to adverse loss by landholders, the community or the State of Queensland, but will significantly increase the risk that major flood damage will occur as the design flood is exceeded.

None of the assessment documents for GBSDA rail proposals detail adverse effects due to the railway at flood levels greater than the 1 in 100 year ARI and all are silent on possible additional damage caused by railway infrastructure raising flood levels during these high floods. There is no mention of landholders being offered compensation for these additional costs. Condition 19 of GVK Hancock's Alpha Rail approval seeks a \$200,000 bond for damage audits and compensation but the investigation and rectification of any damage is limited to 500m from the rail line.

¹⁷⁷ GHD, 2013b, p57

¹⁷⁸ QCG, 2012, p134

¹⁷⁹ Hancock Coal, 2011e, p8

¹⁸⁰ Waratah Coal, 2011a, p27

¹⁸¹ Waratah Coal Pty Ltd, 2013k, Table 2.1, p8

¹⁸² QCG, 2013, p88

Despite adopting design criteria that will not withstand major flooding events, none of the current rail proponents provide any information about what would happen if the design flood is exceeded or culverts are blocked by flood debris. Questions that need to be answered include:

- Does the culvert wash out?
- Is the rail embankment overtopped and breached?
- Are fences at risk because of the higher water velocities?
- Are farm access tracks closed for longer times?
- What happens to landholder's stock?
- And will inundation periods be long enough to destroy pastures?

These events and the costs associated with them will increase significantly if the current designs for hydraulic structures are retained and flood return periods are reduced by climate change.

5.1.3 Climate change and flooding

The Queensland EPA Guidelines for preparing a Climate Change Impact Statement (CCIS) includes predicted impacts on Queensland infrastructure including: include:

- An average annual temperature rise of up to 4.5C.
- A potential increase in intensity of extreme rainfall events.
- Changes in relative humidity and potential evaporation of 7% to 15%
- A sea level rise of 30 cm by 2100.
- A 10% increase in cyclone intensity and frequency.
- An increase in storm surge of .5m in the 1-in-100 year event
- An increase in frequency and intensity of storms.¹⁸³

Queensland's Inland Flood Study proposed that Queensland local governments work into their planning a climate change factor for 5% increased rainfall intensity per degree of warming, and suggested that they plan for 2 degrees of warming by 2050, and 3 degrees by 2070,¹⁸⁴ at which point, some proponents of Galilee Basin mines and rail lines still claim they are expecting to be hauling coal to port for sale. There is no recognition in the Environmental Impact Statements of the rail lines of individual proponents, or in the Galilee Basin State Development Area Scheme that the Government or the companies understand that they should be planning for a 15% increase in rainfall intensity, and the inundation of their special schemes.

GVK Hancock Coal's assessment of the impact of changing climactic conditions on their rail line concludes that, "the design standards utilised for the Project have sufficiently considered any potential impacts and that no specific mitigation or management measures are required."¹⁸⁵ This could not be further from the truth.

¹⁸³ Hancock Prospecting, 2010g Table 3-5, p 4-10

¹⁸⁴ DERM, 2010

¹⁸⁵ Hancock Prospecting, 2010g p11

¹⁸⁶ GHD, 2013i, p5

GVK Hancock's Drainage Report admits that over the 30 year life of Alpha and Kevin's Corner mines risks are likely to be greater due to the possible impacts due to projected climate change, but no evidence is presented of where they have made allowances for these additional impacts in the design of projects or the mitigation of impacts.

While Adani discusses the impact of climate change in general terms in various chapters of the EIS, the Hydrology and Hydraulics Report for the North Galilee Rail Project makes clear that no allowance have been made for the impact that climate change will have on storm and flood intensities over the 90 year lifetime of the rail project. Instead, they assert that, "Qualitative measures of consequence were developed based on the risk criteria"¹⁸⁶ – whatever that means. For flood immunity criteria to be determined and design elements such as culvert opening sizes, bridge spans, height of the rail embankments, inundation periods and afflux levels to be determined, historic data must be modified to incorporate projected climate change impacts. It does not appear that Adani have incorporated climate change impacts into these calculations for their North Galilee Rail project, despite their intention for the project to continue operating into the next century. If this is the case, all the hydrologic modeling, flood modelling, and concept hydraulic design of bridges, culverts, and rail embankments detailed in the EIS needs to be reworked to enable the best estimate of what landholders can expect over the next 90 years, not what might have happened if the railway had been built in previous years. A new design will expose landholders to a new suite of risks.



Sunflower Image: Paula Heelan



6. Conclusion

Queensland has one of the most naturally variable climates in the world, and it is projected to become more variable and extreme in the future, potentially affecting the frequency or severity of natural hazards, particularly floods. With 57 tropical cyclones having passed within 200 km of the GBSDA area since 1906, the planning behind the GBSDA and the railway in it should have prioritised flood mitigation. None of the rail projects, however, proposed for the GBSDA comply with Queensland State Planning Policy 1/03 or the most recent Australian Rainfall and Runoff Revision for Blockage of Hydraulic Structures by Engineers Australia.

The GBSDA includes over half a million hectares of land that regularly experiences flooding. The proposed GBSDA precincts cut across 1680 waterways between the Galilee Basin and Abbot Point. Any railways built there would require substantial drainage works to mitigate flood impacts exacerbated by elevated rail lines that cross these waterways and floodplains. The potential impacts these rail lines would have on flooding is therefore significant and should have been the subject of substantial precautionary flood avoidance. Instead, proponents have been allowed to minimise costs by only providing flood immunity to one in 50 year floods and for culverts in smaller catchments, one in 20 year. Such negligent cost avoidance puts at risk the communities of the region, its infrastructure and agricultural productivity.

For the mine with the theoretical longest life, Carmichael, the failure rate for any one of their culverts will be about once every 3 years. The chance of the design flood of ARI of 1 in 50 being exceeded during the life of the project is 84 per cent. For minor waterways, proposed to be designed to withstand only a one in 20 year flood, the potential failure rate of any one of their culverts is 10 times a year and there is a 40 per cent chance over any ten year period, and a 64 per cent chance over any 20 year period, that the design flood will be exceeded. Even for the rail lines servicing mines with shorter lifetimes, there is a 45 per cent chance that the 50 year flood ARI will be exceeded and a 78 per cent chance that the 20 year flood ARI will be exceeded.¹⁸⁷ These events and the costs associated with them will increase significantly if the current designs for hydraulic structures are retained and flood return periods are reduced by climate change.

None of the rail proposals detail the adverse effects that may eventuate at flood levels greater than the 1 in 100 year ARI and all are silent on possible additional damage caused by railway infrastructure raising flood levels during these high floods. There is no mention of landholders being offered compensation for these additional costs. Although Hancock's Alpha Rail approval recommends a \$200,000 bond for damage audits and compensation, the investigation and rectification of any damage is limited to 500m from the rail line. The costs and extent of flood damage potentially caused by rail infrastructure is likely to be orders of magnitude greater.

The potential impacts on the region's agricultural productivity should have been of paramount importance in the selection of rail corridor and its drainage and flood immunity design. Though some proponents have claimed to have taken agricultural land into consideration as a constraint in choosing their alignment, it is clear that construction and operating costs have been the overriding factor in most alignments and the flood designs selected.

The significance of the loss of thousands of hectares of Good Quality Agricultural Land and important cropping and horticulture areas is deemed by rail proponents as "moderate" and the economic impact "low". Waratah Coal was so unconcerned with the impact its Galilee China First Project railway would have on agricultural land it didn't even include them in the EIS for the project. Relevant Queensland Government

¹⁸⁷ Hancock Coal, 2011e, p8

Departments intervened to complain that the assessments failed to adequately address the impacts and had “not been conducted to an acceptable level of detail”.¹⁸⁸ In response, in its 267 page evaluation report of Waratah’s Galilee Coal Project, the Queensland Coordinator-General’s mentions the word “agriculture” five times and “cropping” just eight. The 398 page Coordinator-General’s report on the Alpha Coal Project mentions agriculture nine times and “cropping” or “crops” only twice.¹⁸⁹

About half the area of the proposed GBSDA precincts for rail alignments is mapped as either potential cropping, perennial and annual horticulture and intensive livestock production, including over 10,000 ha of mapped Important Agricultural Area and 12,000 hectares of potential Strategic Cropping Land. And yet, this important farmland can be excised, assessed and invalidated out of existence through a process designed to remove obstacles to mining while providing lip service to agricultural land conservation. Having already been subjected to this process, the area of the region still in the Strategic Cropping Land trigger map is reduced to just 1,146 hectares, which can then be further reduced through soil analysis. Once reduced to almost nothing, mining companies will be able to “mitigate” the loss by paying a fee between \$4750 per and \$15,000 per hectare -- a “financial contribution commensurate” with the area of impact land that is a “common and reasonable management approach to minimise potential strategic cropping land impacts.”¹⁹⁰

The Galilee Basin State Development Area scheme proposes that rail infrastructure within the proposed rail precincts of the GBSDA should minimise impacts on existing infrastructure, but no mention is made of minimising impacts on the almost 220,000 hectares of productive farmland within the precincts, which will be sterilised, fragmented or impacted by exacerbated flooding.

Under the terms of the State Development Area scheme, the Coordinator-General will not support land uses anywhere in the area that are not inconsistent with rail infrastructure, and landholders will have to apply for permission to continue using the land as they are currently doing. Although cropping and animal husbandry are listed by the scheme as activities that “may be consistent,” with the railways, farmers will have to pay a fee to apply to continue farming as long as they had approval to use the land in such a way before the SDA comes into effect. The Coordinator General has the power to refuse the application with no right of appeal.

The weight of uncertainty alone for these landowners within the GBSDA is enough to drive down land prices and chill beneficial agricultural productivity, let alone expansion. A similar scheme in the Surat Basin resulted in a reported 30% loss in land values.¹⁹¹ Despite this fiasco, the Newman Government appears intent on following a similar strategy with landholders in the Mackay, Isaac and Whitsunday Region.

After many years of promises by successive state Governments of assistance in addressing the decline of Queensland agricultural productivity, the Newman Government is set to deliver another hammer blow. If all five duplicate rail lines are built from the Galilee Basin to Abbot Point, the cumulative impacts would be unacceptable, but even one new rail alignment in addition to that of Aurizon’s existing line poses an unacceptable impact, under the circumstances.

Rather than helping fulfil its promise of achieving a doubling of agricultural productivity and food production by 2040, the Queensland Government has stated its intention to facilitate the loss of prime agricultural land in Central Queensland by compulsory acquisition and has bent over backwards to accommodate coal companies demands for favours, handouts and easy regulatory approval pathways. The Government has even promised free or discounted water permits and lower royalty payments for the

¹⁸⁸ Hancock Coal, 2011e, p8

¹⁸⁹ QCG, 2012.

¹⁹⁰ Adani Mining Pty Ltd, 2012b, p57

¹⁹¹ Quoted in Penelope Arthur, 12 December 2013. ‘Wandoan’s rail woe.’ Queensland Country Life.

first company to jump in and develop in the Galilee Basin.

The continued imbalance in the Government's policy approach, which privileges damaging mining activity and its infrastructure needs over other, long-established land uses in rural Central Queensland is leading to the irreversible loss of good quality land, and diminishing rather than expanding the state's food production ability. Despite its being one of the "four pillars" of the Queensland economy, agricultural production has been in decline in Queensland for decades. Farmers have recently had reason for hope this may at last be turned around after their State Government recognised the greatest barriers to addressing agriculture's decline by a sustainable by recognising the competition from the mining sector for land, water and labour. However, the promise of doubling agriculture, fisheries and forestry production by 2040, including a commitment to double food production, can never be met while ever agricultural land is being lost and fragmented.

The new rail projects proposed for the GBSDA will reduce the area of available high quality farmland in Queensland, fragment the agricultural landscape in the Region and create significant additional flood impacts for the local communities and agricultural industries. As a result, the contribution to the State's agricultural production is predicted to decline.

The Regional Plan for the Mackay-Whitsunday-Isaac region claims that the alienation, loss or fragmentation of good quality agricultural land will not be supported unless there is an "overriding need in the public interest for the proposed use, and there are no alternative locations available." In whose interest is it then to alienate and sterilise productive farmland to build railways to export coal to Asia? This does not appear to be a question the State Government is asking.



Image Page 61: Paula Heelan

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Appendix 1:

Privately held land parcels within GBSDA precincts by Local Government Area

Note: More than one lot parcels are attributable to each Station
– see table below for number and area attributed to each Station

Barcaldine Shire Station land parcels within GBSDA Precincts

| Precinct | Station name | Number of parcels | Hectares |
|---------------------------------------|----------------|-------------------|----------|
| South to North Rail Corridor Precinct | SURBITON | 1 | 7,818 |
| South to North Rail Corridor Precinct | FORRESTER | 2 | 2,024 |
| South to North Rail Corridor Precinct | SURBITON SOUTH | 2 | 12,505 |
| Total | | 5 | 22,347 |

Isaac Shire Station land parcels within GBSDA Precincts

| Precinct | Station name | Number of parcels | Hectares |
|---------------------------------------|------------------|-------------------|----------|
| South to North Rail Corridor Precinct | AVON DOWNS | 3 | 3,921 |
| South to North Rail Corridor Precinct | BERESFORD | 2 | 1,608 |
| South to North Rail Corridor Precinct | BOREAS | 1 | 881 |
| South to North Rail Corridor Precinct | DISNEY | 4 | 5,855 |
| Mining Services Precinct | DOOYNE | 2 | 1,075 |
| South to North Rail Corridor Precinct | DURDHAM | 1 | 589 |
| South to North Rail Corridor Precinct | EAGLEFIELD | 2 | 1,153 |
| West to East Rail Corridor Precinct | ELGIN DOWNS STUD | 1 | 1,144 |
| South to North Rail Corridor Precinct | EMIN | 3 | 745 |
| South to North Rail Corridor Precinct | FRANKFIELD | 4 | 5,118 |
| South to North Rail Corridor Precinct | GUNJULLA | 2 | 241 |
| South to North Rail Corridor Precinct | KHARTOUM | 2 | 590 |
| South to North Rail Corridor Precinct | LAGLAN | 2 | 1,485 |
| Mining Services Precinct | MORAY DOWNS | 8 | 29,704 |
| South to North Rail Corridor Precinct | OLD TWIN HILLS | 7 | 1,423 |
| South to North Rail Corridor Precinct | ROSSMORE | 2 | 1,767 |
| South to North Rail Corridor Precinct | SAINT ALBANS | 3 | 1,872 |
| South to North Rail Corridor Precinct | SURBITON | 1 | 0 |
| South to North Rail Corridor Precinct | URELLA | 1 | 102 |
| South to North Rail Corridor Precinct | WAMINDA | 1 | 429 |
| South to North Rail Corridor Precinct | WILLESLEY | 3 | 620 |
| Total | | 55 | 60,323 |

Whitsunday Shire Station land parcels within GBSDA Precincts

| Precinct | Station name | Number of parcels | Hectares |
|---------------------------------------|-----------------------|-------------------|----------|
| South to North Rail Corridor Precinct | ABERDEEN | 1 | 561 |
| South to North Rail Corridor Precinct | AVON DOWNS | 2 | 165 |
| South to North Rail Corridor Precinct | BIRRALEE | 7 | 10,401 |
| South to North Rail Corridor Precinct | CERITO | 5 | 13,497 |
| South to North Rail Corridor Precinct | CORRIEVAHN | 2 | 2,386 |
| South to North Rail Corridor Precinct | GLENALPINE | 3 | 4,838 |
| South to North Rail Corridor Precinct | GUNJULLA | 3 | 931 |
| South to North Rail Corridor Precinct | MOUNT LOOKOUT HOLDING | 5 | 4,914 |
| South to North Rail Corridor Precinct | PINANG | 2 | 1,369 |
| South to North Rail Corridor Precinct | STRATHMORE | 4 | 5,782 |
| South to North Rail Corridor Precinct | VERBENA | 2 | 522 |
| South to North Rail Corridor Precinct | WARRIGAL | 1 | 2,173 |
| South to North Rail Corridor Precinct | WEETALABA NORTH | 4 | 357 |
| South to North Rail Corridor Precinct | WEETALABA SOUTH | 2 | 396 |
| Total | | 43 | 48,292 |

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