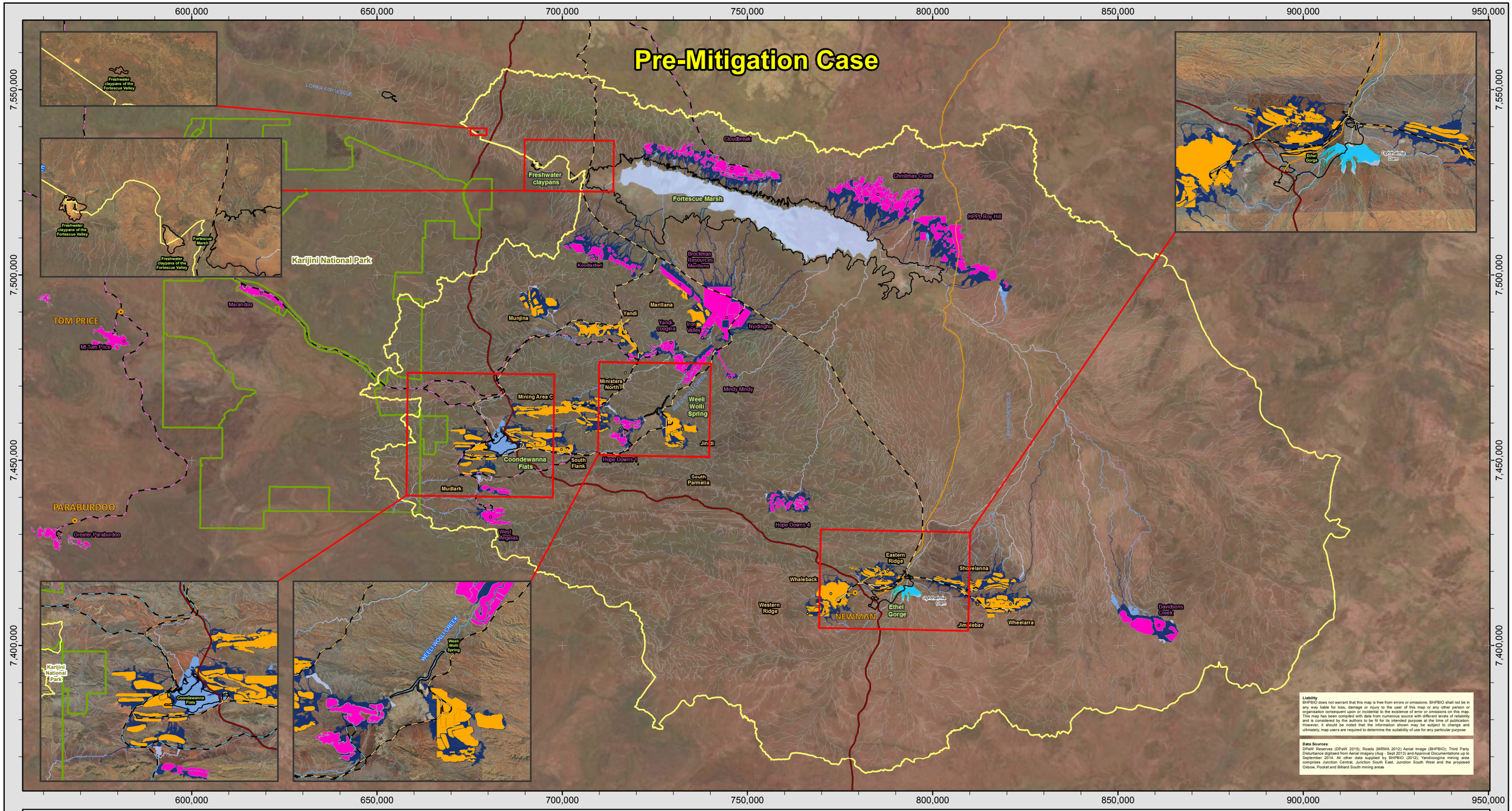
Pre-Mitigation Case



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LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Mining Areas (current & proposed)
- Third Party Mining Areas (current & proposed)
- BHPBIO Rail Corridor
- Third Party Rail Corridor
- Great Northern Highway
- Other Roads
- Drainage Lines 5-30m DEM
- BHP Billiton Iron Ore Disturbance 30% Development Scenario
- Third Party Reasonably Foreseeable Disturbance

Surface Water Reduction

- No or unmeasureable < 5% loss of catchment
- Low 5-20% reduction
- High >20% loss of catchment

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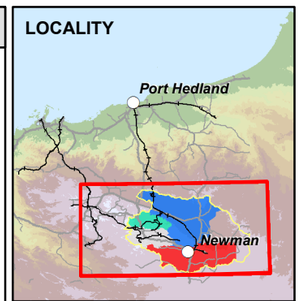
Notes: Pre-mitigation surface water changes

The map shows the change in surface water availability caused by the mining disturbance areas. The assessment was carried out using terrain analysis and is based on:

No runoff occurs from mining disturbance areas
The change of surface water availability is directly proportional to the change in catchment area
Runoff from the upstream catchments are diverted around the disturbance areas and flow to the downstream catchments, 1km downstream of the disturbance areas

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT

Surface Water Change
Cumulative - 30% Development Scenario

N
0 10 20 40 60
Kilometres

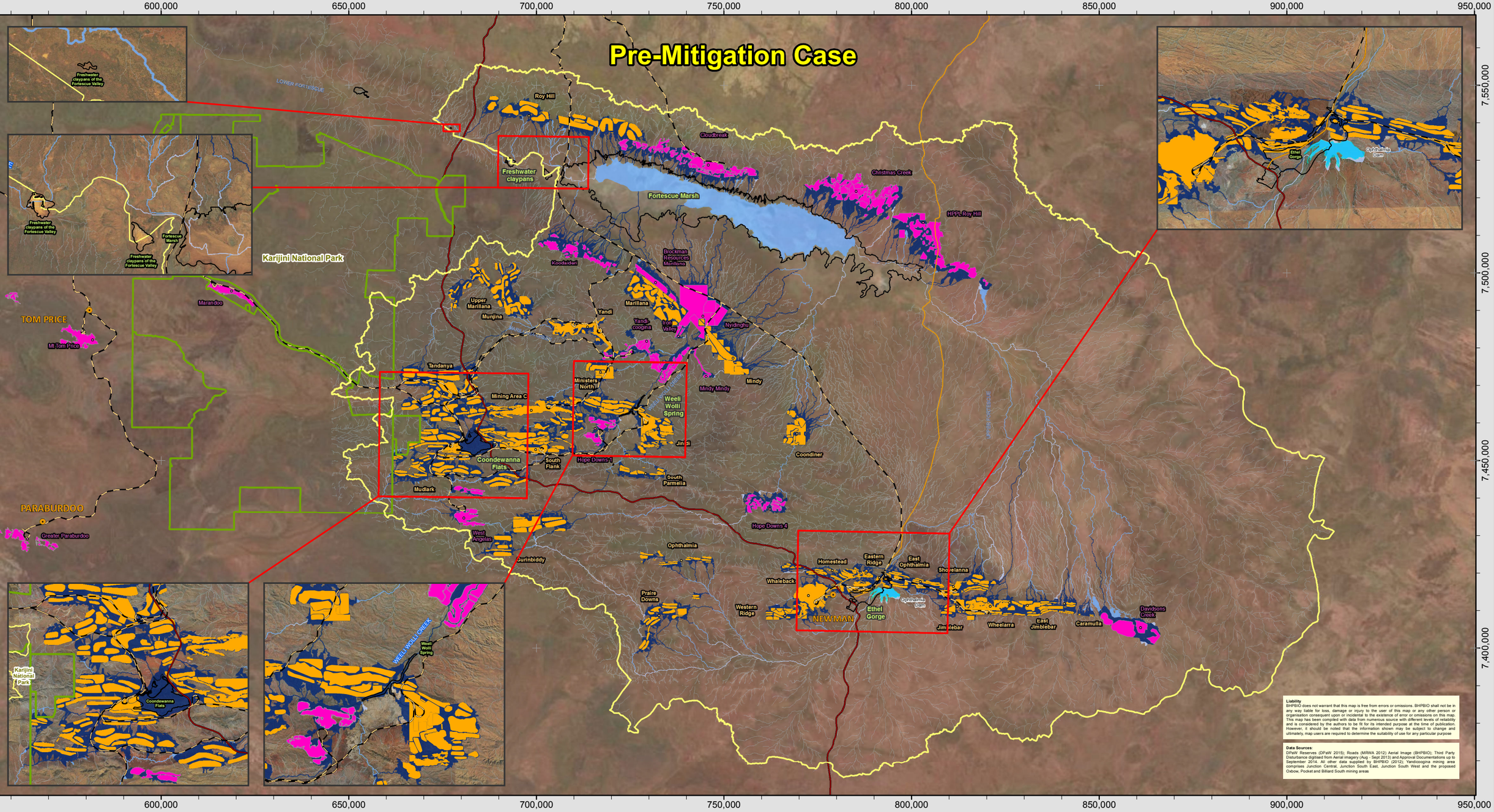
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 15/04/2015	Checked: J Vermaak	Map: 31
	Reviewed: J Youngs	

SW Change

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 31_SW_Change_Maps_Cumulative_30%_RevE

Pre-Mitigation Case



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LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Mining Areas (current & proposed)
- Third Party Mining Areas (current & proposed)
- BHPBIO Rail Corridor
- Great Northern Highway
- Other Roads
- Drainage Lines 5-30m DEM
- BHP Billiton Iron Ore Disturbance Full Development Scenario
- Third Party Reasonably Foreseeable Disturbance

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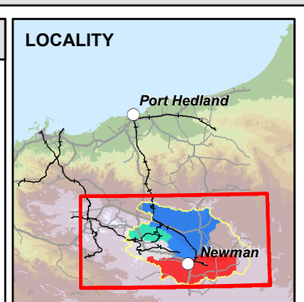

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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT

Surface Water Change
Cumulative - Full Development Scenario

N
0 10 20 40 60
Kilometres

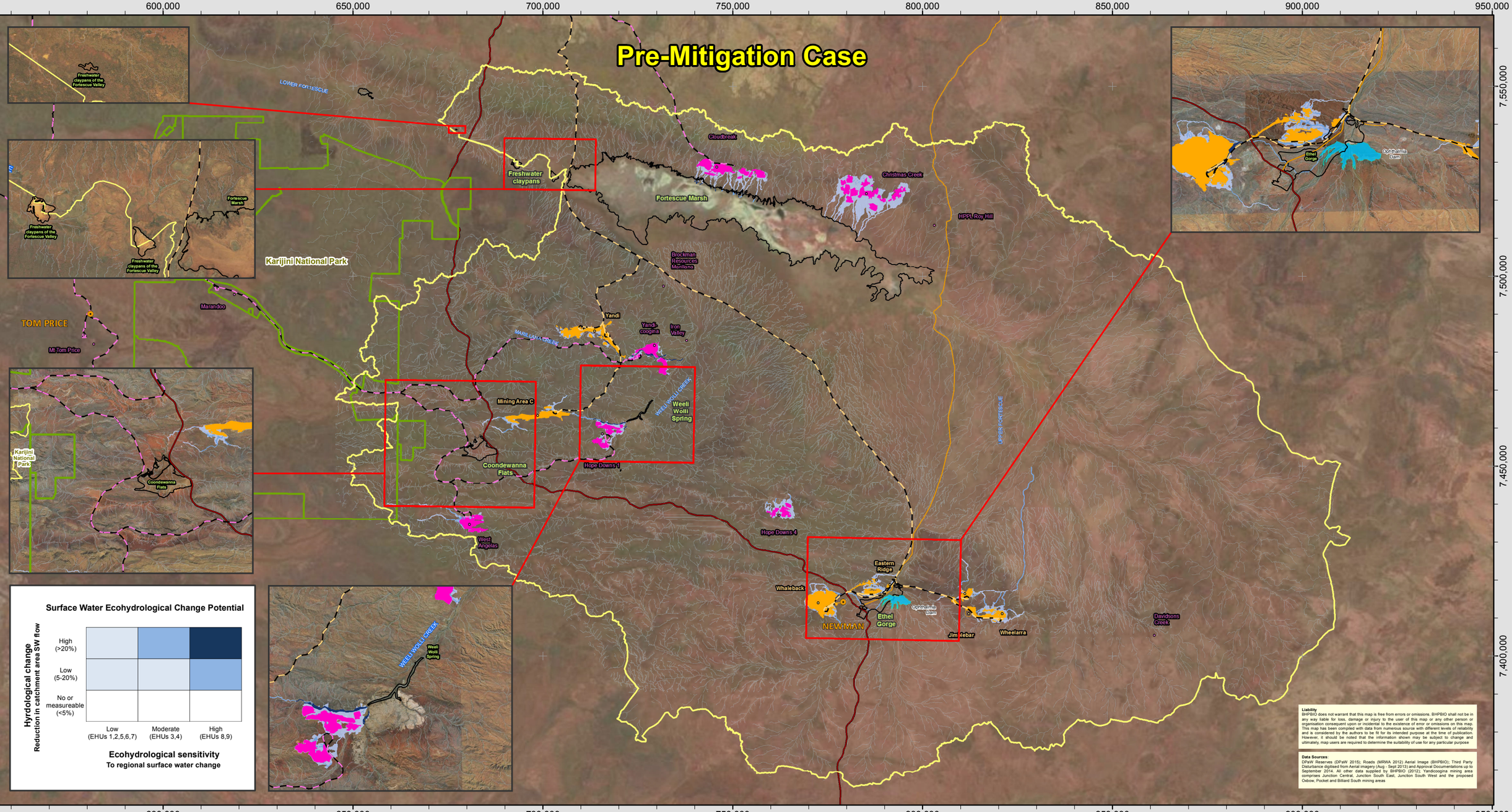
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 15/04/2015	Checked: J Vermaak	Map: 32
	Reviewed: J Youngs	

SW Change

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 32_SW_Change_Maps_Cumulative_Full_RevE

Pre-Mitigation Case



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LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ophthalmia Dam
- Ecohydrological Receptors
- Townships
- BHPBIO Mining Areas
- Third Party Mining Areas
- BHPBIO Rail Corridor
- Third Party Rail Corridor
- Great Northern Highway
- Other Roads
- Drainage Lines 5-30m DEM
- BHP Billiton Iron Ore Existing Disturbance
- Third Party Existing Disturbance

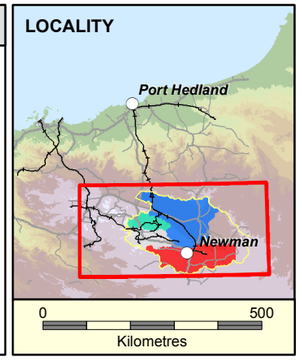
Ecohydrological Change Potential: Surface Water Availability

- Low: Low potential for significant and sustained ecological change
- Moderate: Moderate potential for significant and sustained ecological change
- High: High potential for significant and sustained ecological change

Notes: Pre-mitigation surface water changes

The map shows the potential for ecohydrological change, which has been derived from the surface water change map #30 and the surface water sensitivity map #10, using the surface water ecohydrological change potential matix.

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT

Ecohydrological Change Potential - Surface Water Availability
Cumulative - Existing Development

N
0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 15/04/2015	Checked: J Vermaak	Map: 33
	Reviewed: J Youngs	

SW Change Potential

Document Nam

Pre-Mitigation Case

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE

Freshwater claypans of the Fortescue Valley

Freshwater claypans

Fortescue Marsh

Karijini National Park

TOM PRICE

Munjina

Yandi

Marillana

MARILLANA CREEK

Mining Area C

Coondewanna Flats

Mudlark

South Flank

Ministers North

Weeli Wolli Spring

WEELI WOLLI CREEK

Jinidi

South Parmelia

UPPER FORTESCUE

Eastern Ridge

Whaleback

Western Ridge

NEWMAN

Ethel Gorge

Ophthalmia Dam

Jimblebar

Shovelanna

Wheelarra

Ophthalmia Dam

Surface Water Ecohydrological Change Potential

Hyrdological change: Reduction in catchment area SW flow	Low (EHUs 1,2,5,6,7)	Moderate (EHUs 3,4)	High (EHUs 8,9)
High (>20%)			
Low (5-20%)			
No or measureable (<5%)			

Ecohydrological sensitivity
To regional surface water change

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LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ophthalmia Dam
- Ecohydrological Receptors
- Townships
- BHPBIO Mining Areas (current & proposed)
- BHPBIO Rail Corridor (current & proposed)
- Great Northern Highway
- Other Roads
- Drainage Lines 5-30m DEM
- BHP Billiton Iron Ore Disturbance 30% Development Scenario

Ecohydrological Change Potential: Surface Water Availability

- Low: Low potential for significant and sustained ecological change
- Moderate: Moderate potential for significant and sustained ecological change
- High: High potential for significant and sustained ecological change

Notes: Pre-mitigation surface water changes

The map shows the potential for ecohydrological change, which has been derived from the surface water change map #31 and the surface water sensitivity map #10, using the surface water ecohydrological change potential matix.

LOCALITY

Port Hedland

Newman

0 500 Kilometres

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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT

Ecohydrological Change Potential - Surface Water Availability
BHP Billiton Iron Ore - 30% Development Scenario

N

0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 15/04/2015	Checked: J Vermaak	Map: 34
	Reviewed: J Youngs	

SW Change Potential

Document Nam

Pre-Mitigation Case

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

Freshwater claypans of the Fortescue Valley

Freshwater claypans of the Fortescue Valley

Fortescue Marsh

Freshwater claypans of the Fortescue Valley

Freshwater claypans of the Fortescue Valley

Karijini National Park

Marandoo

TOM PRICE

Mt Tom Price

Karijini National Park

Coondewanna Flats

Mudlark

West Angelas

LOWER FORTESCUE

Freshwater claypans

Cloudbreak

Fortescue Marsh

Christmas Creek

HPPL Roy Hill

Brockman Resources Marillana

Koodaideri

Marillana

Munjina

Yandi

Yandi Cooginia

Iron Valley

Nyidinghu

MARILLANA CREEK

Ministers North

Mining Area C

Weeli Wolli Spring

WEELI WOLLI CREEK

Mindy Mindy

Jinidi

Coondewanna Flats

South Flank

Hope Downs 1

South Parmelia

Hope Downs 4

UPPER FORTESCUE

Eastern Ridge

Whaleback

Western Ridge

NEWMAN

Ethel Gorge

Ophthalmia Dam

Shovelanna

Jimblebar

Wheelarra

Davidsons Creek

Ophthalmia Dam

Ethel Gorge

Surface Water Ecohydrological Change Potential

Hyrdological change
Reduction in catchment area SW flow

	Low (EHUs 1,2,5,6,7)	Moderate (EHUs 3,4)	High (EHUs 8,9)
High (>20%)			
Low (5-20%)			
No or measureable (<5%)			

Ecohydrological sensitivity
To regional surface water change

WEELI WOLLI CREEK

Weeli Wolli Spring

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LEGEND

- Ecohydrology Study Boundary
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- Ophthalmia Dam
- Ecohydrological Receptors
- Townships
- BHPBIO Mining Areas (current & proposed)
- Third Party Mining Areas (current & proposed)
- BHPBIO Rail Corridor (current & proposed)
- Third Party Rail Corridor (current)
- Great Northern Highway
- Other Roads
- Drainage Lines 5-30m DEM
- BHP Billiton Iron Ore Disturbance 30% Development Scenario
- Third Party Reasonably Foreseeable Disturbance

Ecohydrological Change Potential: Surface Water Availability

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LOCALITY

Port Hedland

Newman

0 500
Kilometres

Resource Planning Hydrology
BHP BILLITON IRON ORE

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ECOHYDROLOGICAL CHANGE ASSESSMENT

Ecohydrological Change Potential - Surface Water Availability
Cumulative - 30% Development Scenario

N

0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J	
Date: 15/04/2015	Checked: J Vermaak	Map: 35	
	Reviewed: J Youngs		

SW Change Potential

Document Nam

Pre-Mitigation Case

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE
UPPER FORTESCUE
MARILLANA CREEK
WEELI WOLLI CREEK

Roy Hill
Freshwater claypans
Fortescue Marsh
Karijini National Park
TOM PRICE
Upper Marillana
Munjina
Marillana
Yandi
Tandanya
Mining Area C
Ministers North
Weeli Wolli Spring
Jinidi
Mindy
Coondiner
Coondewanna Flats
South Flank
South Parmelia
Mudlark
Ophthalmia
Gurinbiddy
Homestead
Eastern Ridge
East Ophthalmia
Shorelanna
Whaleback
Prairie Downs
Western Ridge
NEWMAN
Ethel Gorge
Ophthalmia Dam
Jimblebar
Wheelarra
East Jimblebar
Caramulla

Freshwater claypans of the Fortescue Valley

Surface Water Ecohydrological Change Potential

Hyrdological change
Reduction in catchment area SW flow

	Low (EHUs 1,2,5,6,7)	Moderate (EHUs 3,4)	High (EHUs 8,9)
High (>20%)			
Low (5-20%)			
No or measureable (<5%)			

Ecohydrological sensitivity
To regional surface water change

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LOCALITY

Port Hedland
Newman

0 500
Kilometres

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resourcing the future

Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT

Ecohydrological Change Potential - Surface Water Availability
Cumulative - 30% Development Scenario

N
0 10 20 40 60
Kilometres

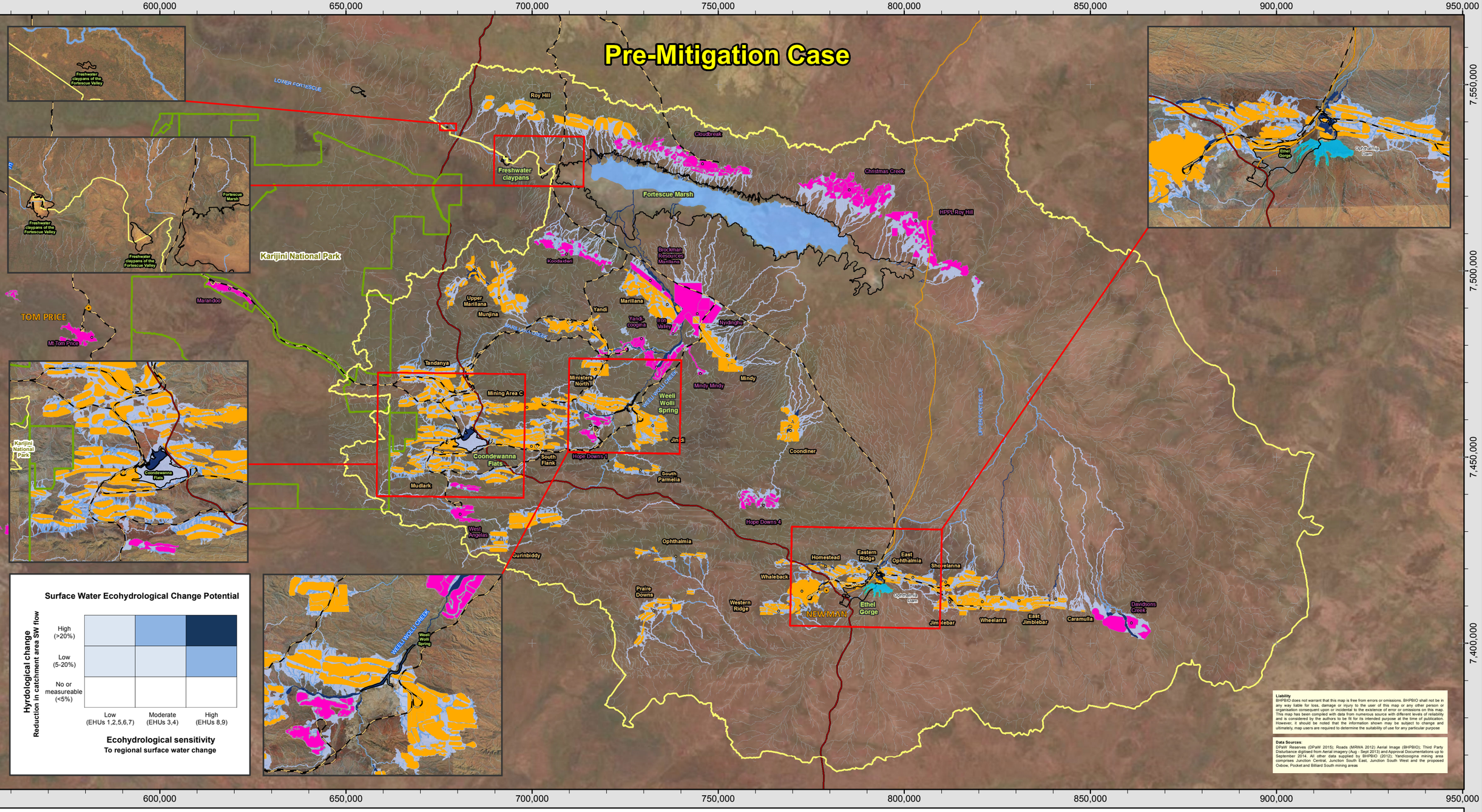
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 15/04/2015	Checked: J Vermaak	Map: 36
	Reviewed: J Youngs	

SW Change Potential

Document Nam

Pre-Mitigation Case



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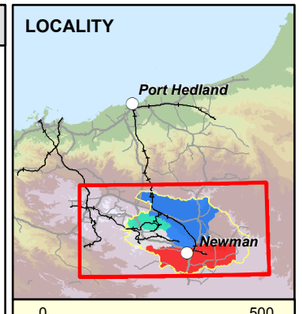

Resource Planning Hydrology
BHP BILLITON IRON ORE

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resourcing the future

ECOHYDROLOGICAL CHANGE ASSESSMENT
Ecohydrological Change Potential - Surface Water Availability
Cumulative - Full Development Scenario

N
0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 15/04/2015	Checked: J Vermaak	Map: 37
	Reviewed: J Youngs	

SW Change Potential

Document Nam

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE
Freshwater claypans
Fortescue Marsh
Karijini National Park
TOM PRICE
Yandi
MARILLANA CREEK
Mining Area C
WEELI WOLLI CREEK
Weeli Wolli Spring
Coondewanna Flats
UPPER FORTESCUE
PARABURDOO
Eastern Ridge
Whaleback
NEWMAN
Fithel Gorge
Ophthalmia Dam
Jimblebar
Wheelarra

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600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

Surplus Water Management

LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Rail Corridor
- Third Party Rail Corridor
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

Surplus Water Management - Current

- 1 Net water negative mining areas – short-term surplus water management in the framework of feasible water options
- 2 Net water positive mining areas – ability to manage surplus water through Ophthalmia Dam MAR scheme
- 3 Net water positive mining areas – ability to manage surplus water through Marillana Creek discharge

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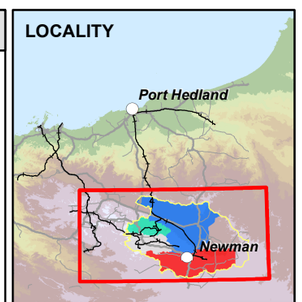
Notes:

BHP Billiton Iron Ore is currently managing surplus water through the Ophthalmia Dam MAR scheme and Marillana Creek discharge. Trial surplus water management schemes comprises groundwater injection (MAC and Jimblebar mining areas), discharge to Jimblebar Creek (Jimblebar) and pit storage (MAC)

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT
Surplus Water Management (BHP Billiton Iron Ore)
Current

N
0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: N King	Revision: Rev A
Date: 7/05/2015	Checked: J Vermaak	Map: 38
	Reviewed: J Youngs	

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 38_Surplus_Water_Management_Current_RevE

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE
Freshwater claypans
Fortescue Marsh
Karijini National Park
TOM PRICE
PARABURDOO
Munjina
Yandi
Marillana
MARILLANA CREEK
Ministers North
Mining Area C
WEELI WOLLI CREEK
Weeli Wolli Spring
Jinidi
Coondewanna Flats
South Flank
South Parmelia
Mudlark
UPPER FORTESCUE
Eastern Ridge
Shovelanna
Whaleback
Western Ridge
NEWMAN
Fthel Gorge
Ophthalmia Dam
Jimblebar
Wheelarra

Liability
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Data Sources:
DPaW Reserves (DPaW 2015); Roads (MRWA 2012) Aerial Image (BHPBIO); Third Party Disturbance digitised from Aerial imagery (Aug - Sept 2013) and Approval Documentations up to September 2014. All other data supplied by BHPBIO (2012). Yandicoogina mining area comprises Junction Central, Junction South East, Junction South West and the proposed Oxbow, Pocket and Billiard South mining areas

LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Rail Corridor
- Third Party Rail Corridor
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

Surplus Water Management - 30% Development Scenario

- 1 Net water negative mining areas – short-term surplus water management in the framework of feasible water options
- 2 Net water positive mining areas – ability to manage surplus water through Ophthalmia Dam MAR scheme
- 3 Net water positive mining areas – ability to manage surplus water through Marillana Creek discharge
- 4 Net water positive mining areas – require long-term water management in the framework of feasible water options

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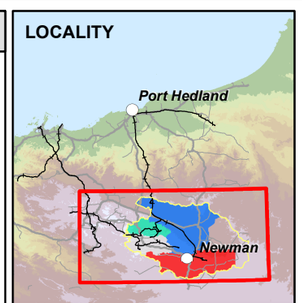
Notes:

Continued surplus water management through Ophthalmia Dam MAR scheme and Marillana Creek discharge and other water surplus methods in line with the Feasible Water Options. BHP Billiton Iron Ore has the ability to manage surplus water from MAC through water transfers to other water negative mining areas in the Central Pilbara Region.

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT

Surplus Water Management (BHP Billiton Iron Ore)
30% development scenario

N
0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: N King	Revision: Rev A
Date: 7/05/2015	Checked: J Vermaak	Map: 39
	Reviewed: J Youngs	

Surplus Water Management

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 39_Surplus_Water_Management_30%_RevE

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE
Koy Hill
Freshwater claypans
Fortescue Marsh
Karijini National Park
TOM PRICE
PARABURDOO
Upper Marillana
Munjina
Yandi
Marillana
MARILLANA CREEK
Tandanya
Ministers North
Mindy
Mining Area C
WEELI WOLLI CREEK
Weeli Wolli Spring
Jinidi
Coondiner
UPPER FORTESCUE
Coondewanna Flats
South Flank
South Parmelia
Mudlark
Ophthalmia
Gurinbiddy
Homestead
Eastern Ridge
East Ophthalmia
Shovelanna
Whaleback
Prairie Downs
Western Ridge
NEWMAN
Fthel Gorge
Ophthalmia Dam
Jimblebar
Wheelarra
East Jimblebar
Caramulla

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LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Rail Corridor
- Third Party Rail Corridor
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

Surplus Water Management - Full Development Scenario

- 1 Net water negative mining areas – short-term surplus water management in the framework of feasible water options
- 2 Net water positive mining areas – ability to manage surplus water through Ophthalmia Dam MAR scheme
- 3 Net water positive mining areas – ability to manage surplus water through Marillana Creek discharge
- 4 Net water positive mining areas – require long-term water management in the framework of feasible water options
- Closed

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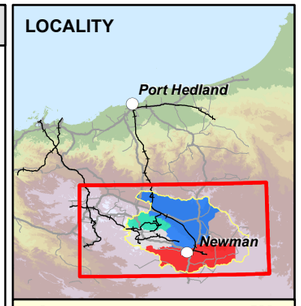
Notes:

Continued surplus water management through Ophthalmia Dam MAR scheme and Marillana Creek discharge and other water surplus methods in line with the Feasible Water Options. The Marillana, Mindy and Coondiner mining areas require long-term water management in the framework of feasible water options.

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT

Surplus Water Management (BHP Billiton Iron Ore)

Full development scenario

N

0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: N King	Revision: Rev A
Date: 7/05/2015	Checked: J Vermaak	Map: 40
	Reviewed: J Youngs	

Surplus Water Management

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 40_Surplus_Water_Management_Full_RevE

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

Freshwater claypans of the Fortescue Valley

LOWER FORTESCUE

Roy Hill

Freshwater claypans of the Fortescue Valley

Fortescue Marsh

Freshwater claypans

Fortescue Marsh

Karijini National Park

TOM PRICE

Upper Marillana

Munjina

Marillana

Yandi

MARILLANA CREEK

Tandanya

Mining Area C

Ministers North

WEELI WOLLI CREEK

Weeli Wolli Spring

Mindy

Jinidi

Coondiner

Coondewanna Flats

South Flank

Mudlark

South Parmelia

Karijini National Park

Coondewanna Flats

UPPER FORTESCUE

Ophthalmia

Gurinbiddy

Homestead

Eastern Ridge

East Ophthalmia

Shovelanna

Whaleback

Prairie Downs

Western Ridge

NEWMAN

Ethel Gorge

Ophthalmia Dam

Jimblebar

Wheelarra

East Jimblebar

Caramulla

Ophthalmia Dam

Ethel Gorge

WEELI WOLLI CREEK

Weeli Wolli Spring

Acid Metaliferous Drainage Potential

Volume BWT Mining (below water table)

High (>700MT)

Moderate (100-700MT)

Low (<100MT)

CID Channel Iron Deposits

MM Marra Mamba Iron Deposits

BKM Brockman Iron Deposits

Ore Type

Data Sources:
DPaW Reserves (DPaW 2015); Roads (MRWA 2012) Aerial Image (BHPBIO); Third Party Disturbance digitised from Aerial imagery (Aug - Sept 2013) and Approval Documentations up to September 2014. All other data supplied by BHPBIO (2012). Yandicoogina mining area comprises Junction Central, Junction South East, Junction South West and the proposed Oxbow, Pocket and Billiard South mining areas

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

LEGEND

- SEA Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Mining Areas (current & proposed)
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

AMD unmanaged deposits - without mitigation measures BHP Billiton Iron Ore

- Low: Impossible to very unlikely to generate significant acidic conditions (198)
- Moderate: Unlikely to generate significant acidic conditions (19)
- High: Likely to generate significant acidic conditions (3)

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Notes:

The AMD potential map describes the potential for Acid and Metalliferous Drainage occurring at the BHPBIO deposits Full Development Scenario
.
The AMD potential map was derived from two datasets namely:
1) Ore Type
2) Volume Below Water Table (BWT) Mining

The AMD potential was derived based on the likelihood of the host rock geology having acid generating characteristics and the magnitude of disturbance and degree of weathering based on below water table tonnage of each deposit.

LOCALITY

Port Hedland

Newman

0 500

Kilometres

bhpbilliton resourcing the future

Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT
Distribution of Acid and Metalliferous Drainage Potential
BHP Billiton Iron Ore, Full Development Scenario

N

0 10 20 40 60

Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev K
Date: 7/05/2015	Checked: J Vermaak	Figure: 41
	Reviewed: J Youngs	

AMD Potential

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 41_AMD_Source_Risk_Full_RevE

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE

Cloudbreak

Christmas Creek

Freshwater claypans

Fortescue Marsh

Karijini National Park

TOM PRICE

MARILLANA CREEK

WEELI WOLLI CREEK

Weeli Wolli Spring

UPPER FORTESCUE

Coondewanna Flats

PARABURDOO

NEWMAN

Fthal Gorge

Ophthalmia Dam

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Data source
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600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- Third Party Mining Areas
- BHPBIO Rail Corridor
- Third Party Rail Corridor
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

Third Party Existing Disturbance

- Current mining areas with high salinity groundwater interception during dewatering

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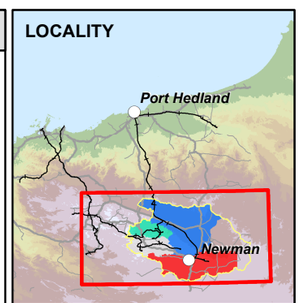
Notes:

High salinity groundwater interception during dewatering at Cloudbreak and Christmas Creek Operations is managed through managed aquifer recharge (MAR)

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT
High Salniity Groundwater Interception During Current Dewatering

N

0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev I
Date: 7/05/2015	Checked: J Vermaak	Map: 42
	Reviewed: J Youngs	

High Salinity

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 42_High_Salinity_GW_2014_RevE

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE

Freshwater claypans

Cloudbreak

Christmas Creek

Fortescue Marsh

Karijini National Park

TOM PRICE

Marillana

Nyidinghu

MARILLANA CREEK

WEELI WOLLI CREEK

Weeli Wolli Spring

UPPER FORTESCUE

Coondewanna Flats

PARABURDOO

NEWMAN

Fthel Gorge

Ophthalmia Dam

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LEGEND

- Ecohydrological Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Mining Areas (current & proposed)
- Third Party Mining Areas (current & proposed)
- BHPBIO Rail Corridor (current & proposed)
- Third Party Rail Corridor (current)
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

Third Party Reasonably Forseeable Disturbance

- Mining areas with high salinity groundwater interception during dewatering existing to 30% development scenario

Notes:

Above Water Table (AWT) mining operations at Marillana (BHP Billiton Iron Ore) – no high salinity groundwater interception

Mainly Above Water Table (AWT) mining at Koodaideri - no high

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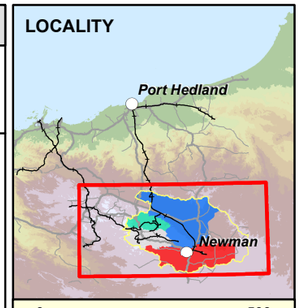
LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT
Potential High Salinity Groundwater Interception
Dewatering Existing - 30% Development Scenario

N
0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 7/05/2015	Checked: J Vermaak	Map: 43
	Reviewed: J Youngs	

High Salinity

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 43_High_Salinity_GW_30%_RevE

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE
Koy Hill
Cloudbreak
Christmas Creek
Freshwater claypans
Fortescue Marsh
Karijini National Park
TOM PRICE
Marillana
Nyidinghu
Mindy
Weeli Wolli Spring
UPPER FORTESCUE
Coondewanna Flats
PARABURDOO
NEWMAN
Fthel Gorge
Ophthalmia Dam

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600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

LEGEND

- Ecohydrological Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Mining Areas (current & proposed)
- Third Party Mining Areas (current & proposed)
- BHPBIO Rail Corridor (current & proposed)
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

BHP Billiton Iron Ore Disturbance Full Development Scenario
- Mining areas with high salinity groundwater interception during dewatering: 30% development - Full development

Third Party Reasonably Forseeable Disturbance
- Mining areas with high salinity groundwater interception during dewatering: 30% development - Full development

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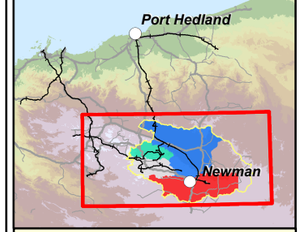
Notes:

All BHPBIO and third party operations closed by Full Development Scenario

Mainly Above Water Table (AWT) mining at Koodaideri - no high salinity groundwater interception

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT
Potential High Salniity Groundwater Interception
Dewatering 30% Development - Full Development Scenario

N
0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev J
Date: 7/05/2015	Checked: J Vermaak	Map: 44
	Reviewed: J Youngs	

High Salinity

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 44_High_Salinity_GW_Full_RevE

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

7,550,000 7,500,000 7,450,000 7,400,000

LOWER FORTESCUE
Koy Hill
Freshwater claypans
Fortescue Marsh
Karijini National Park
TOM PRICE
Upper Marillana
Munjina
Marillana
Yandi
MARILLANA CREEK
Tandanya
Ministers North
Mining Area C
WEELI WOLLI CREEK
Weeli Wolli Spring
Mindy
Jinidi
Coondewanna Flats
South Flank
Coondiner
South Parmelia
Mudlark
PARABURDOO
Ophthalmia
Gurinbiddy
Homestead
Eastern Ridge
East Ophthalmia
Shovelanna
Whaleback
Prairie Downs
Western Ridge
Ophthalmia Dam
Fthel Gorge
NEWMAN
Jimblebar
Wheelarra
East Jimblebar
Caramulla
UPPER FORTESCUE

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Data Sources: DPaW Reserves (DPaW 2015); Roads (MRWA 2012) Aerial Image (BHPBIO); Third Party Disturbance digitised from Aerial imagery (Aug - Sept 2013) and Approval Documentations up to September 2014. All other data supplied by BHPBIO (2012); Yandicoogina mining area comprises Junction Central, Junction South East, Junction South West and the proposed Oxbow, Pocket and Billiard South mining areas

600,000 650,000 700,000 750,000 800,000 850,000 900,000 950,000

LEGEND

- Ecohydrology Study Boundary
- Karijini National Park
- Ecohydrological Receptors
- Ophthalmia Dam
- Townships
- BHPBIO Mining Areas (current & proposed)
- BHPBIO Rail Corridor (current & proposed)
- Great Northern Highway
- Other Roads
- Major Drainage Lines
- Minor Drainage Lines

BHP Billiton Iron Ore

No pit lake formation
- Above water table orebodies (7)
- Orebodies infilled to above pre-mining water table through BAU infilling (118)

Ability to infill pit void to above the pre-mining water table, if required as closure objective
- Adequate overburden material at orebody to infill pit void (47)
- Mining area overburden scheduling required to infill pit void (21)

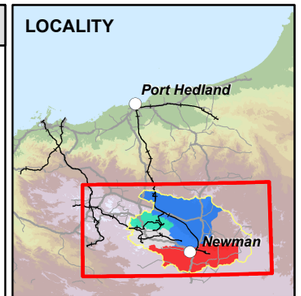
No ability to infill pit void to above the pre-mining water table at mining area scale
- Inadequate overburden material in mining area to infill pit void (27)

The content of this map is conceptual only, of a general nature and does not purport to contain all information relevant to future project development associated with the Project. This map has been prepared solely for the purposes of informing environmental impact assessment pursuant to the Environmental Protection Act 1986 (WA) and Environment Protection and Biodiversity Conservation Act 1999 and is not intended for use for any other purpose. No representation or warranty is given that project development associated with any or all of the disturbance indicated on this map will actually proceed. As project development is dependent upon future events, the outcome of which is uncertain and cannot be assured, actual development may vary materially from this conceptual map.

Notes:

The map shows the approximate locations of BHP Billiton Iron Ore pit voids for the full development scenario. More than half of the pit voids will be above the water table or will be infilled as part of BAU waste scheduling, which will prevent pit lake formation. For the large majority of remaining pit voids, there is adequate overburden material, either at deposit level or at mining area level, to infill pit voids and prevent the formation of pit lakes, if required as part of the closure objective. At some mining areas, there is not enough overburden to infill pit voids to above pre-mining water levels and these area require management focus.

LOCALITY



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Resource Planning Hydrology
BHP BILLITON IRON ORE

ECOHYDROLOGICAL CHANGE ASSESSMENT
Ability to Manage Pit Lakes Through Infilling
BHP Billiton Iron Ore, Full Development Scenario

N

0 10 20 40 60
Kilometres

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator, Datum: GDA 1994, Units: Meter

Scale @ A3: 1:1,000,000	Prepared: J Botterill	Revision: Rev M
Date: 15/04/2015	Checked: J Vermaak	Map: 45
	Reviewed: R Wright	

Pit Void

Document Name: \\entper-fil01\2groups\TSRD Application Drive\Resource Planning\Hydro\WAIO-wide Projects\Strategic Environmental Approval\1 Hydrology all\4 GIS\Maps\ 45_Pit_Void_Backfill_LoA_RevE