



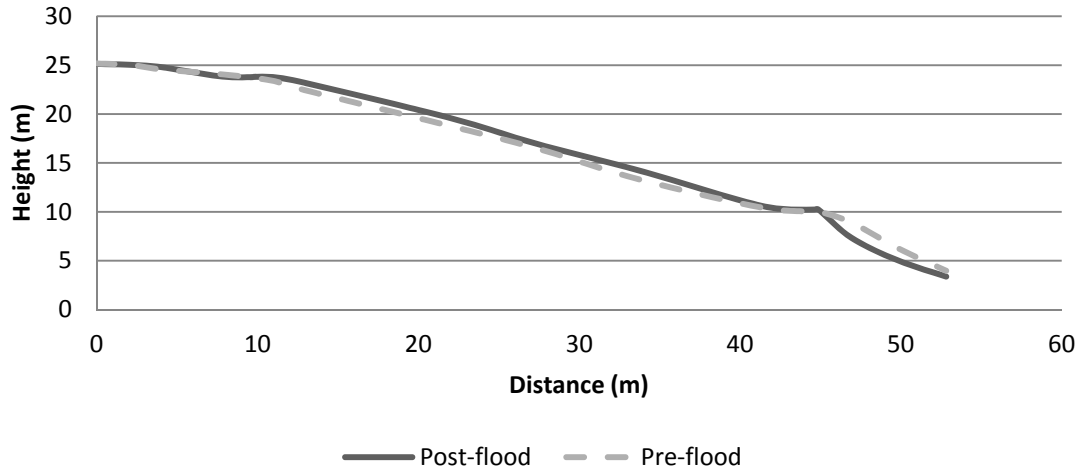
## **Streambank erosion baseline establishment project**

Burnett & Kolan Rivers 2015

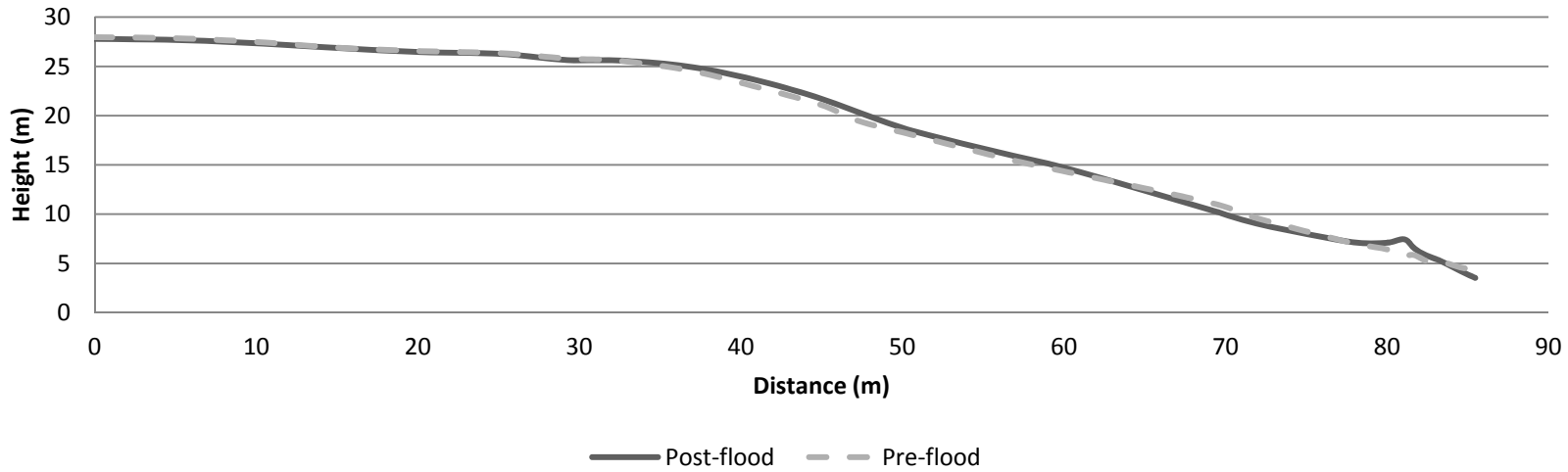
# **Appendix E**

Transect cross-section diagrams

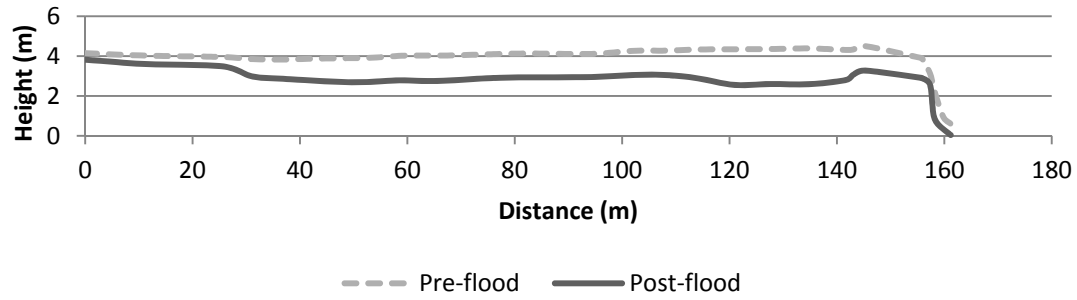
### Site 1 - Transect 1



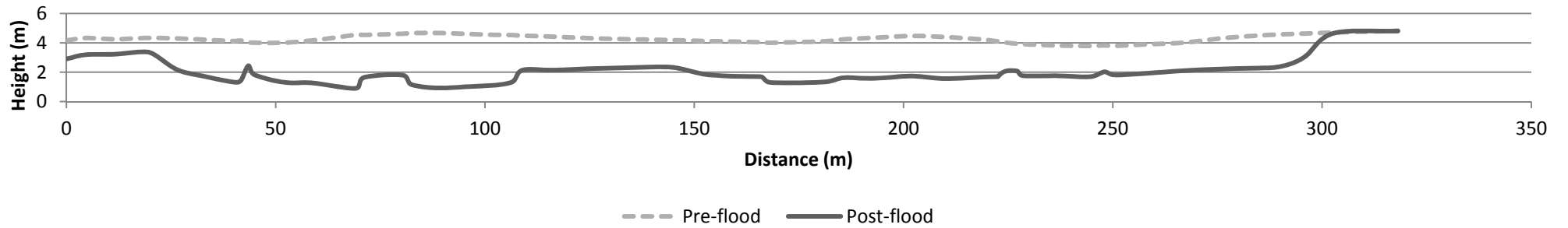
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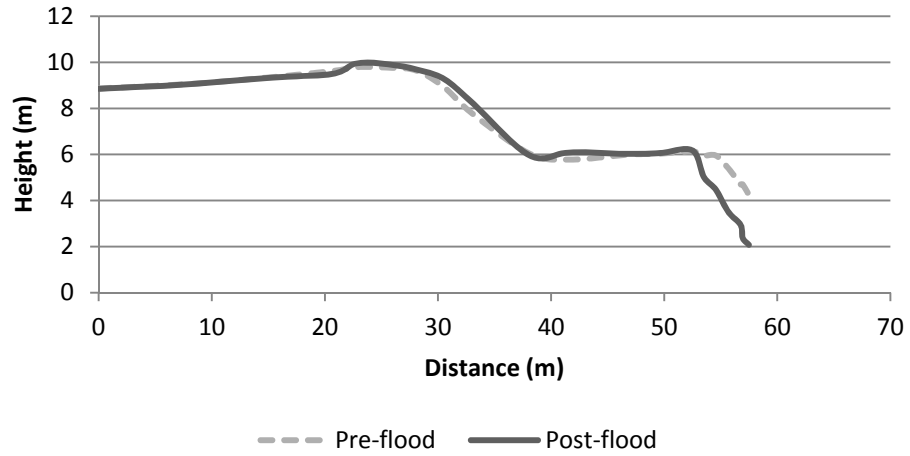
### Site 2 - Transect 1



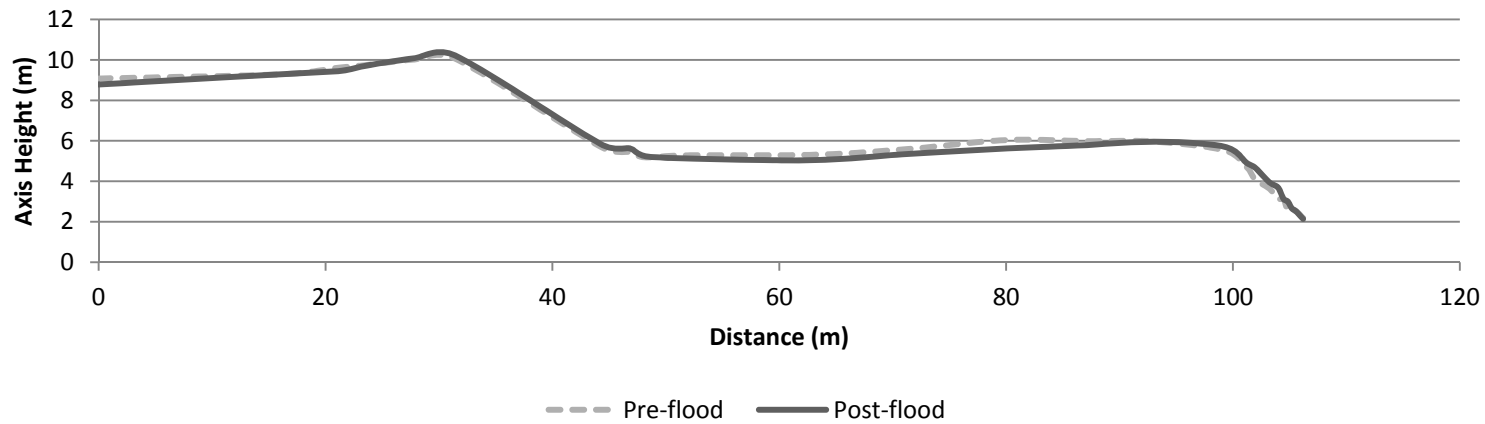
### Site 2 - Transect 2



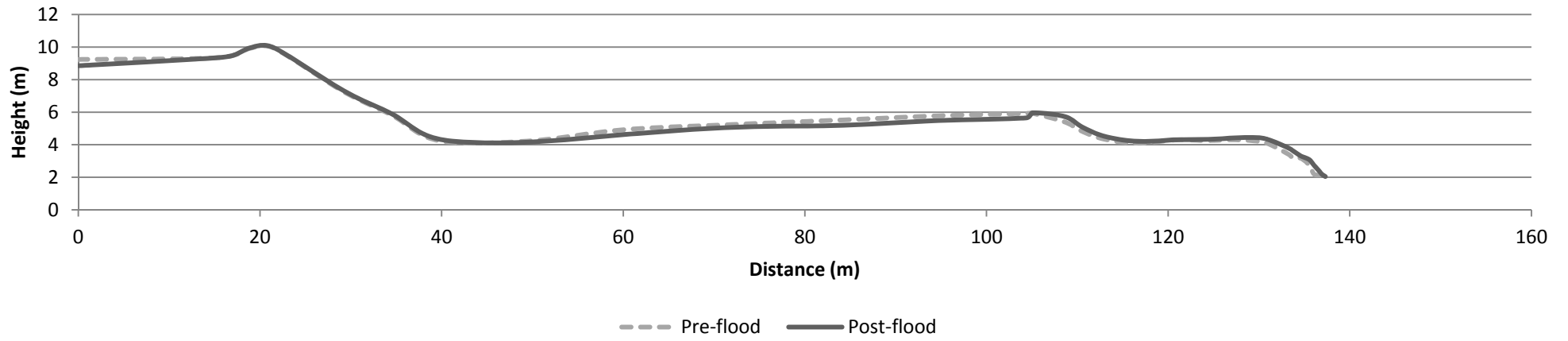
### Site 3 - Transect 1



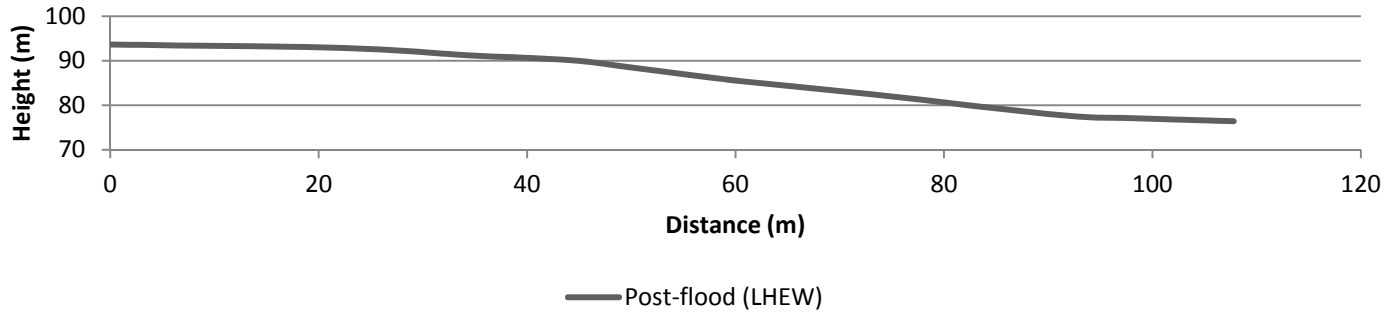
### Site 3 - Transect 2



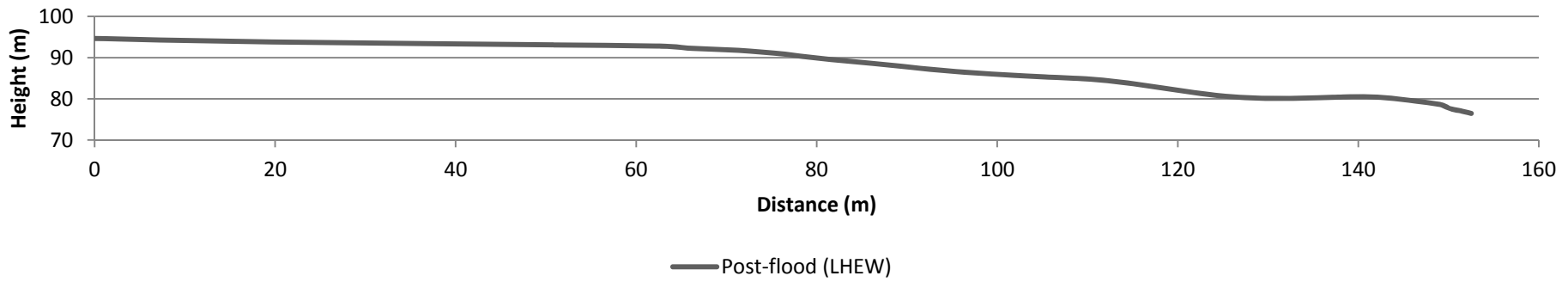
### Site 3 - Transect 3



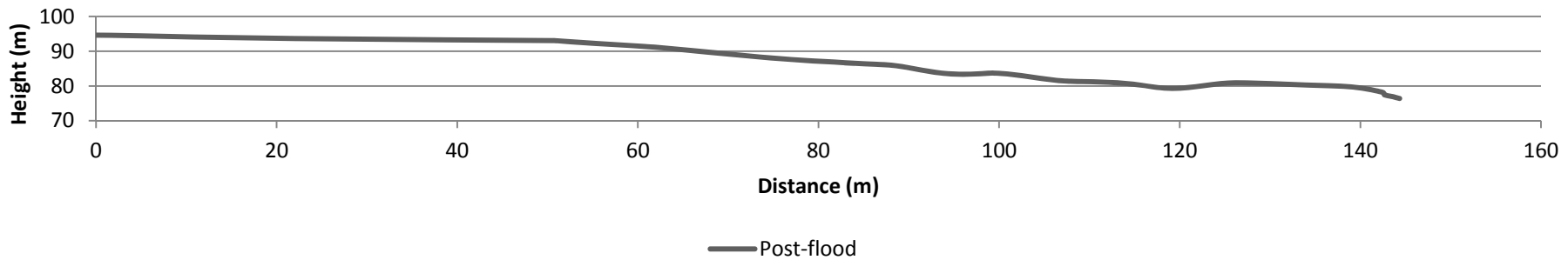
### Site 4 - Transect 1



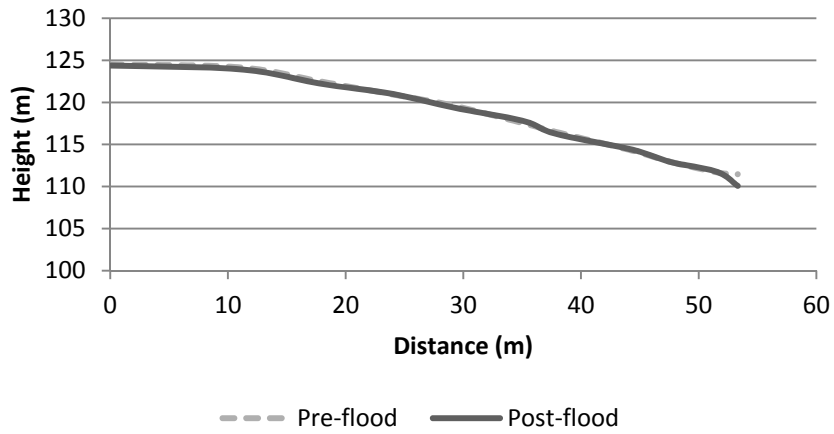
### Site 4 - Transect 2



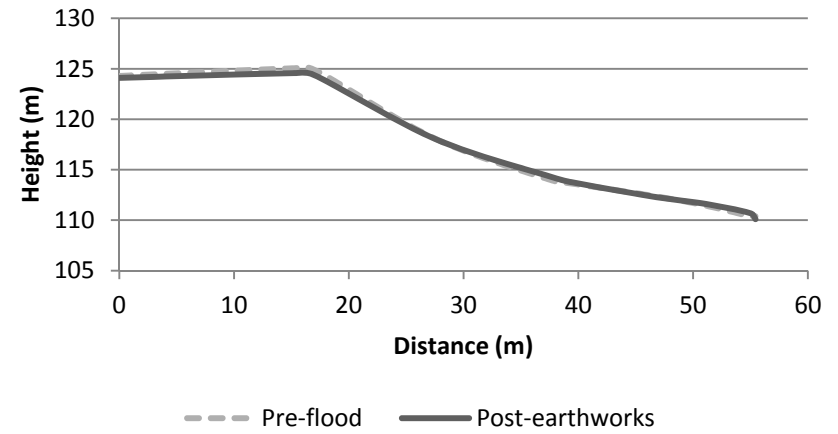
### Site 4 - Transect 3



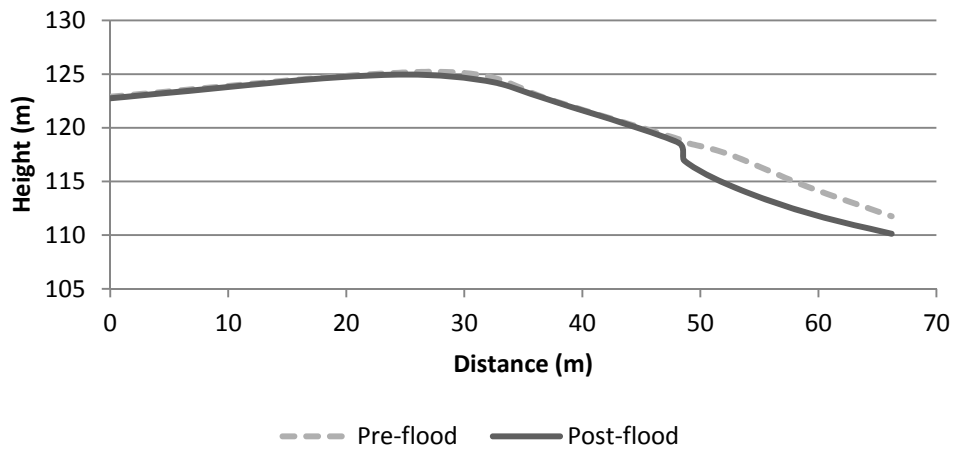
### Site 5 - Transect 1



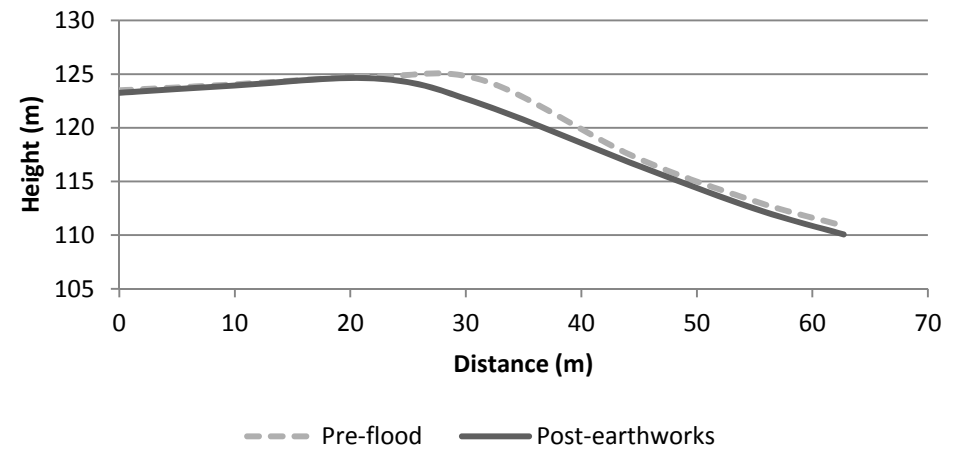
### Site 5 - Transect 2



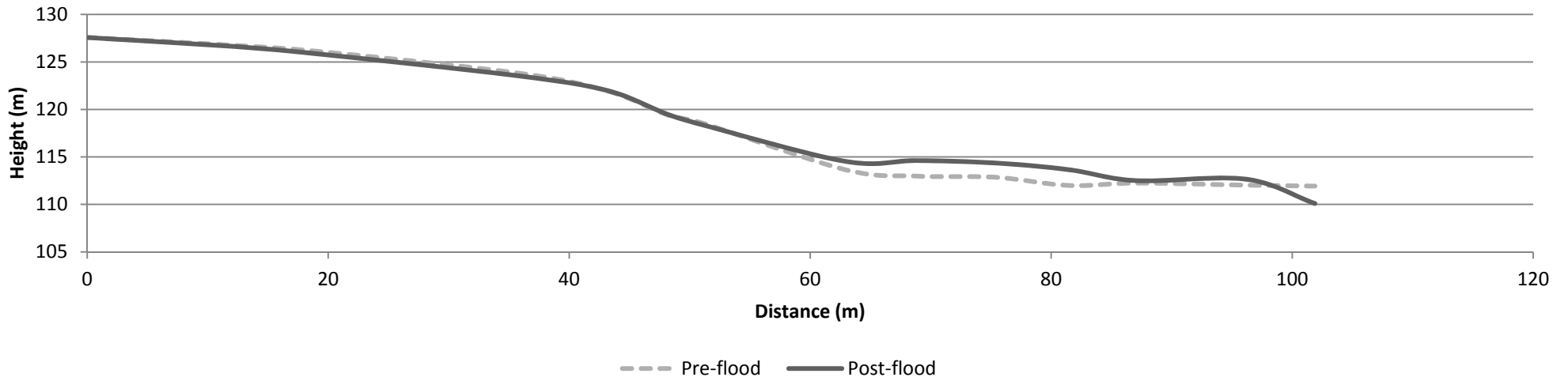
### Site 5 - Transect 3



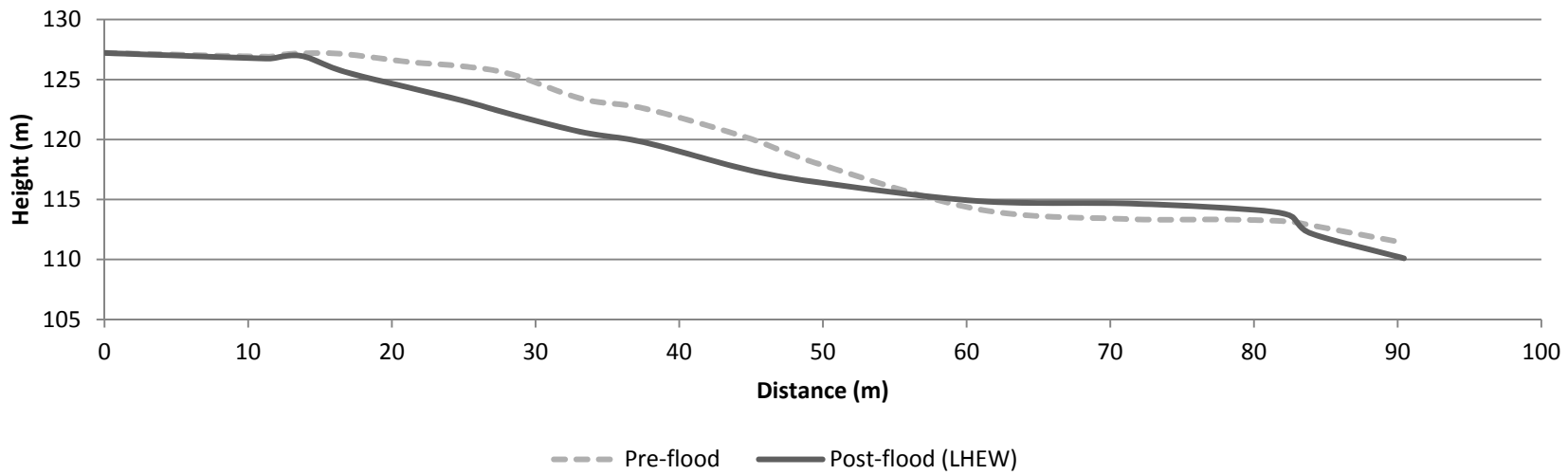
### Site 5 - Transect 4



### Site 6 - Transect 1

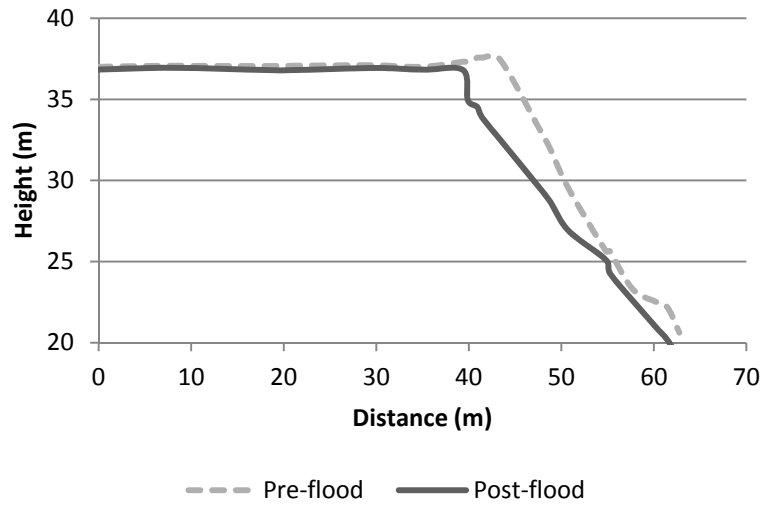


### Site 6 - Transect 2

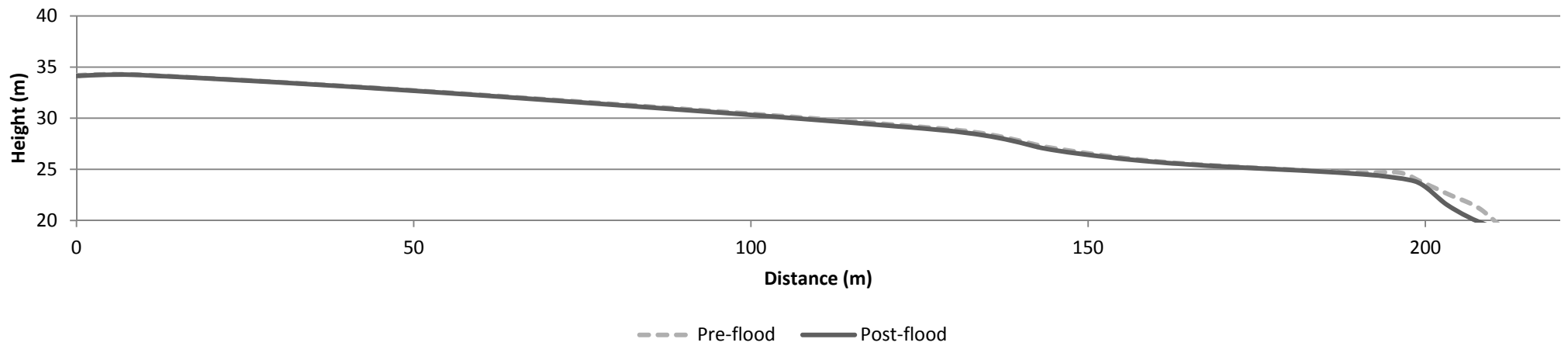




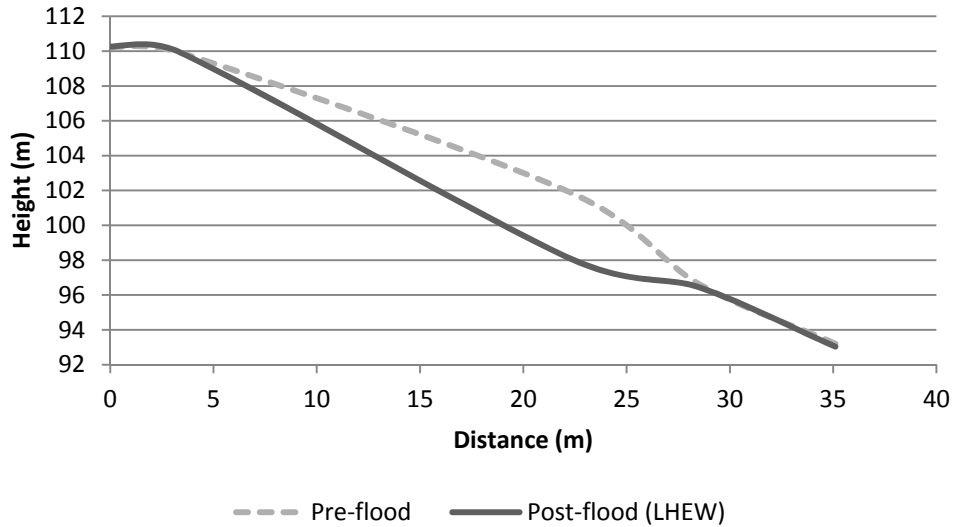
### Site 7 - Transect 1



### Site 7 - Transect 2

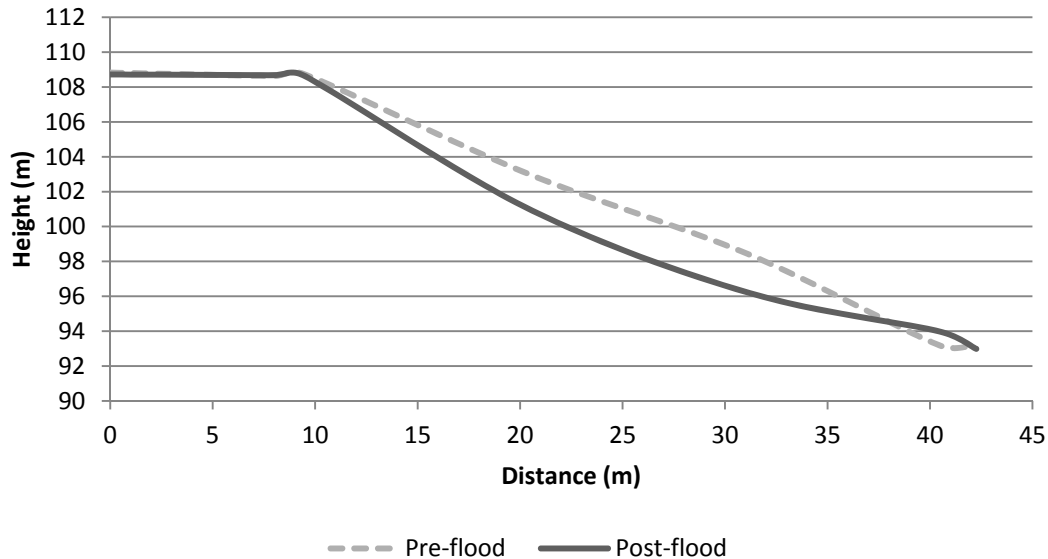


### Site 8 - Transect 1

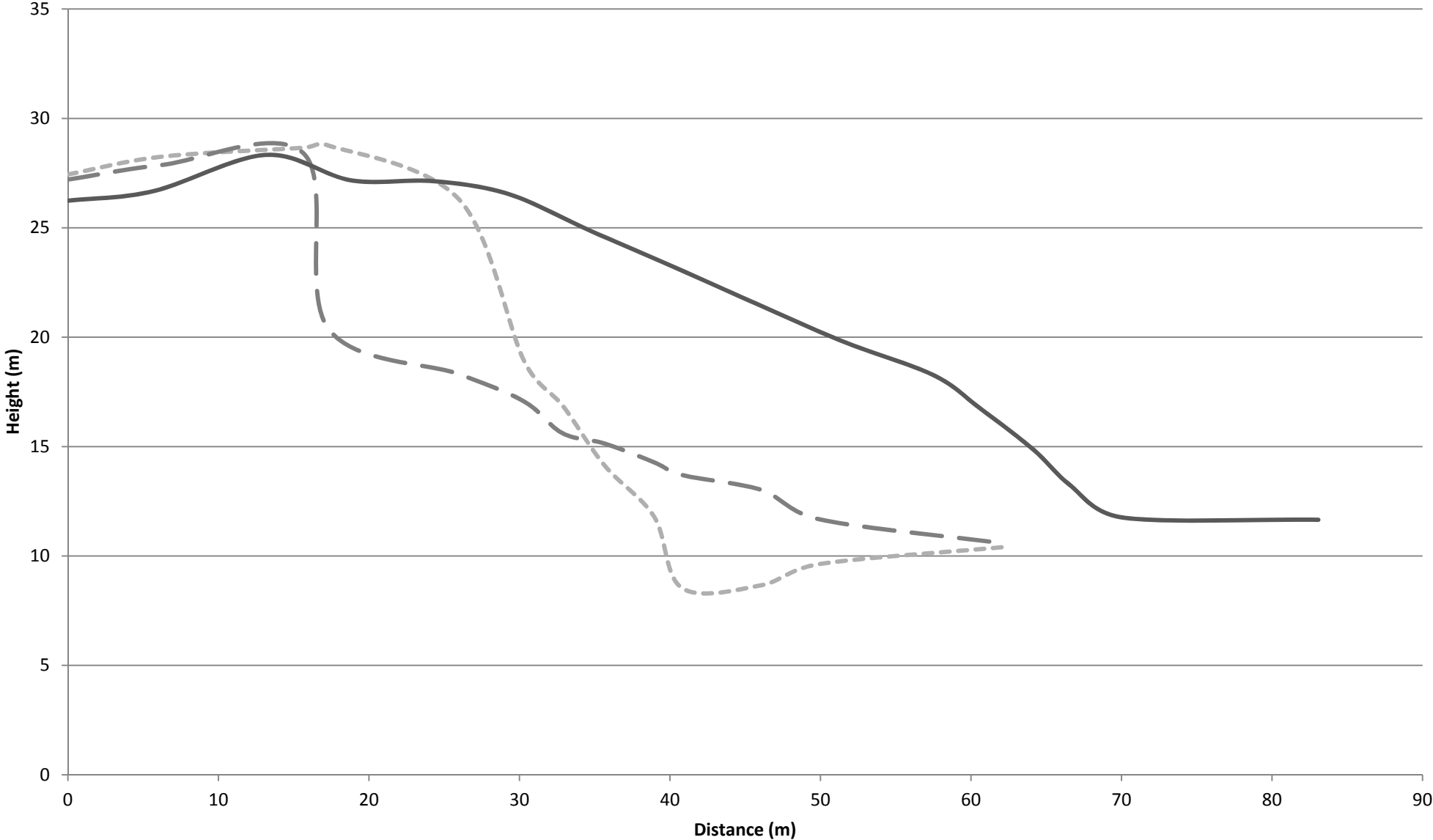


**Note:** Discrepancy between transect lengths shown in cross-section and on report card is due to different starting positions at top of bank. Slope trend shown is accurate.

### Site 8 - Transect 2

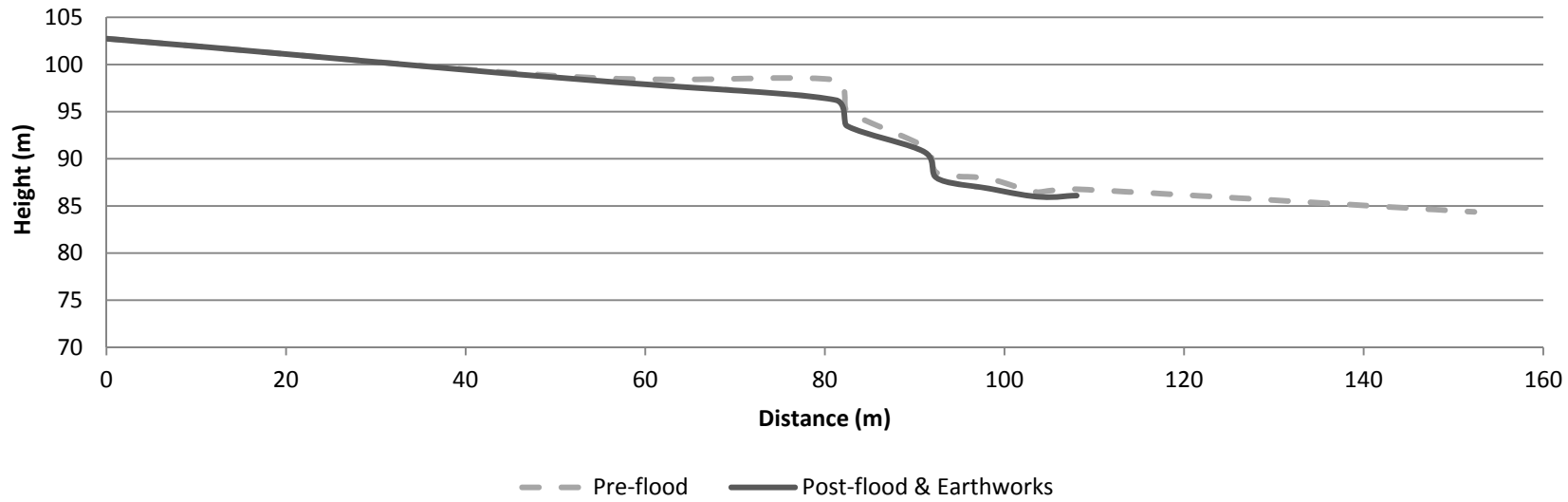


# Site 9 - Transect 1

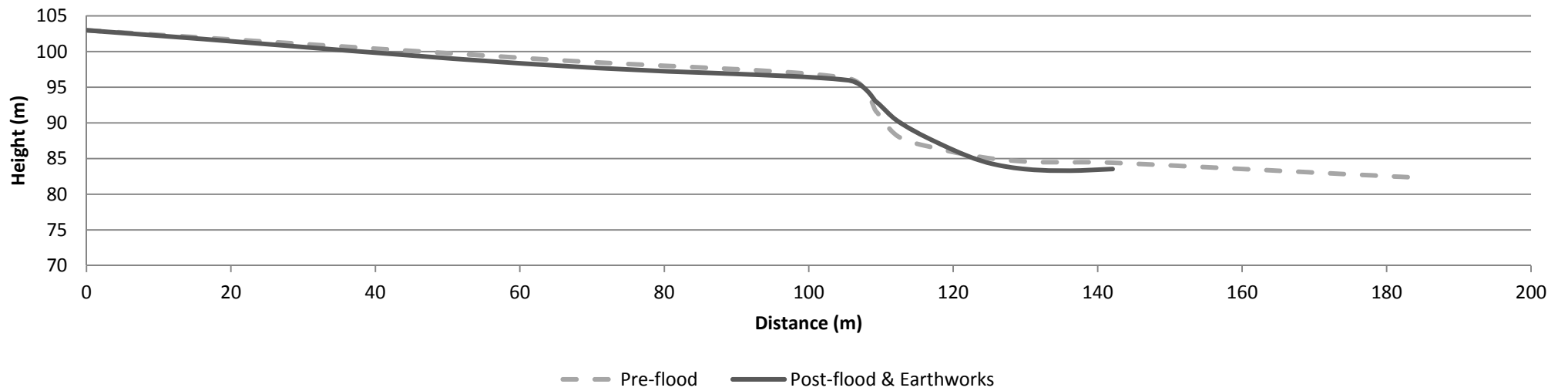


--- Pre-Flood    -.- Post-flood    — Post-earthworks

### Site 10 - Transect 1



### Site 10 - Transect 2





## **Streambank erosion baseline establishment project**

Burnett & Kolan Rivers 2015

# **Appendix F**

Site report cards summarising  
streambank condition transects

## Site 1 – Report Card

### Site Data

Locality	Bundaberg	Soil type (ASC)	Brown Dermosol
River	Lower Burnett	Soil Profile Class	Gahan-Flagstone
Dist. from river mouth	57 m	Geology	Qa
Dist. from structure	16 km US; 33km DS	Regional Ecosystem	12.3.7
Section of river	Straight	Erosion	Scouring & slumping
Bank height (ave)	26 m	Works	Revegetation
Bank length (ave)	74 m	Flood height (2013)	28 m (LiDAR, AHD)
Bank slope class	Moderately inclined	Mean annual rainfall	860 mm
Aspect	Southwest	No. of Transects	2

### Post-Flood Image



### Site Photo



#### PHOTO:

View of site from opposite bank. Image encompasses both transects.

Date: 15/03/2014

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Riparian zone (old railway)	Grazing	Grazing & Horticulture
Pre-flood	Riparian zone (old railway)	Grazing	Grazing & Horticulture
Current	Revegetation (old railway)	Grazing	Grazing & Horticulture
Future	Light grazing (old railway)	Grazing	Grazing & Horticulture

## Pre-flood Management

Riverbank dissected by old railway line, creating a (shorter) lower section and a (longer) upper section. Immediately above the bank is a house and yard, with grazing paddocks and orchard adjacent. Land use within the wider catchment includes rural residential, grazing, horticulture and cropping.

## Flood Damage

Flood waters covered almost all of the property and rose well above the revegetation sites. Infrastructure (including fences) and equipment were damaged. Scouring occurred along the whole bank, with moderate slumping along the lower section below the railway, causing approximately 3m of land to be lost.

## Remedial Works

No earthworks undertaken, revegetation only. Manual removal and spraying of weeds, with some irrigation. Riparian area fenced to exclude stock. Stock (horses and goats) will occasionally be permitted to enter the site for purposes of weed control.

## Maintenance

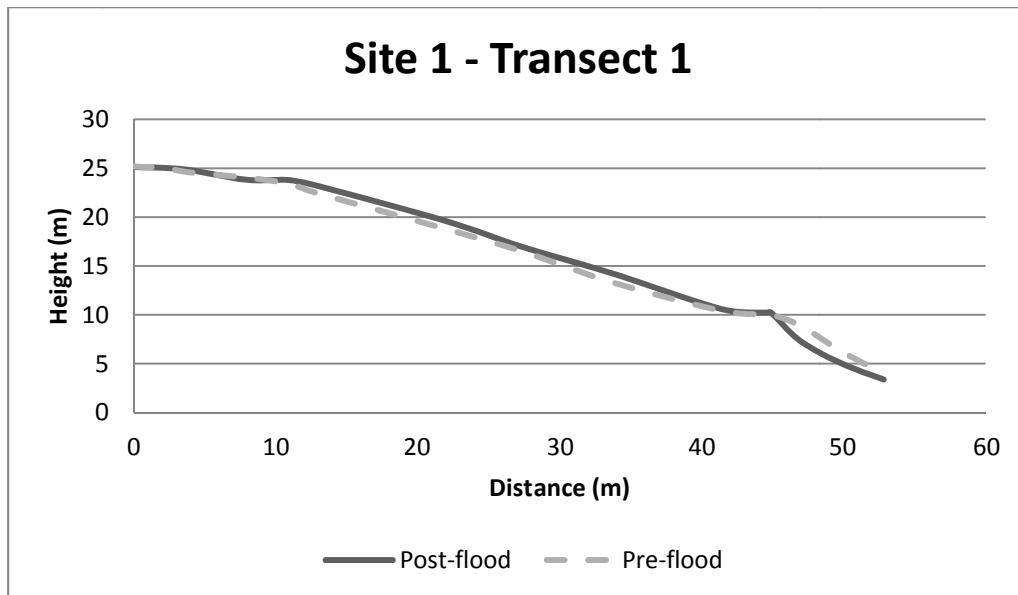
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BMRG project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion, replanting was not undertaken and irrigation regime is unknown.

## Transect 1

### Transect Data

Segment	1	2	3	4	TOTAL
Length (m)	10.9	30.4	3.2	8.3	52.8
Feature	Yard	Riparian	Track	Riparian	
Soil Texture	SL	CLS	CLS	CS	
Bare ground	15 %	0 %	10%	65%	
Weeds	Absent	Present	Present	Present	
Debris	Absent	Present	Present	Present	
Natural trees	0	23	0	1	24
Planted trees	0	0	0	8	8

### Cross-section



### Photo



**PHOTO:** LB1R14(iii)

View of segment 4 from end of transect (at water's edge), looking upslope.

Date: 15/03/2014

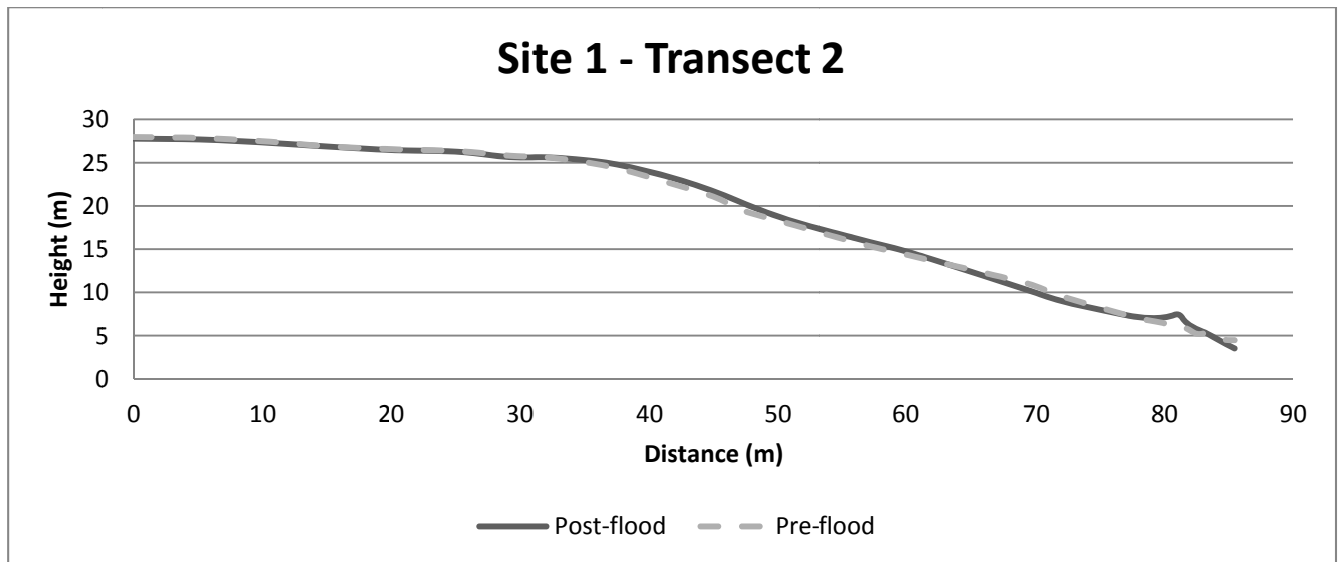


## Transect 2

### Transect Data

Segment	1	2	3	4	TOTAL
Length (m)	32.5	45.1	3.4	4.3	85.3
Feature	Grass	Riparian	Track	Riparian	
Soil Texture	SL	CLS	CLS	CLFS	
Bare ground	20%	5%	25%	70%	
Weeds	Present	Present	Present	Present	
Debris	Absent	Present	Present	Present	
Natural trees	2	17	0	3	22
Planted trees	0	2	0	8	10

### Cross-section



### Photo



**PHOTO:** LB1R22a(iii)

View of middle of segment 2, looking upslope.

Date: 15/03/2014

## Site 2 – Report Card

### Site Data

Locality	Bundaberg	Soil type (ASC)	Stratic Rudosol/ Brown Dermosol
River	Kolan River	Soil Profile Class	Burnett/ Flagstone
Dist. from river mouth	11m	Geology	Qha
Dist. from structure	7km US	Regional Ecosystem	12.1.3
Section of river	Outside bend	Erosion	Scouring (& slumping)
Bank height (ave)	3 m	Works	Revegetation
Bank length (ave)	400 m	Flood height (2013)	6.5 m (LiDAR, AHD)
Bank slope class	Level	Mean annual rainfall	989 mm
Aspect	South	No. of Transects	2

### Post-Flood Image



### Site Photo



**PHOTO:** K2R23a(iv)

Photo taken halfway between Segment 3 and 4 of Transect 2 (approx. 70m from start), looking south towards river.

Area representative of Transect 1 is seen in left of photo.

Date: 14/05/2014

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Sugar cane	Sugar cane	Cropping & Grazing
Pre-flood	Irrigated sugar cane	Irrigated sugar cane	Cropping & Grazing
Current	T1 – revegetation T2 – channel	Irrigated sugar cane	Cropping & Grazing
Future	T1 – revegetation T2 – channel	Irrigated sugar cane	Cropping & Grazing

## Pre-flood Management

Land use at the site prior to the flood was irrigated sugarcane production. At the time of the flood, the paddock had recently been cultivated and was bare. Land use within the wider area is also sugarcane production.

## Flood Damage

Floodwaters covered the entire property, causing extreme floodplain scouring (effectively dissecting the property) and riverbank scouring along the southern bank. Approximately 2–3m of topsoil was lost from 22ha and debris was dumped in the paddock.

## Remedial Works

Significant earthworks were carried out elsewhere on the property by the landholder (details unknown), however no earthworks were conducted at the monitoring sites. Laser levelling by the landholder was undertaken in the paddock immediately north of T1. Revegetation was undertaken in February 2014, primarily at T1. Statutory approval to transplant native mangrove seedlings from nearby to T2 was considered, but not pursued (however natural mangrove revegetation is occurring).

## Maintenance

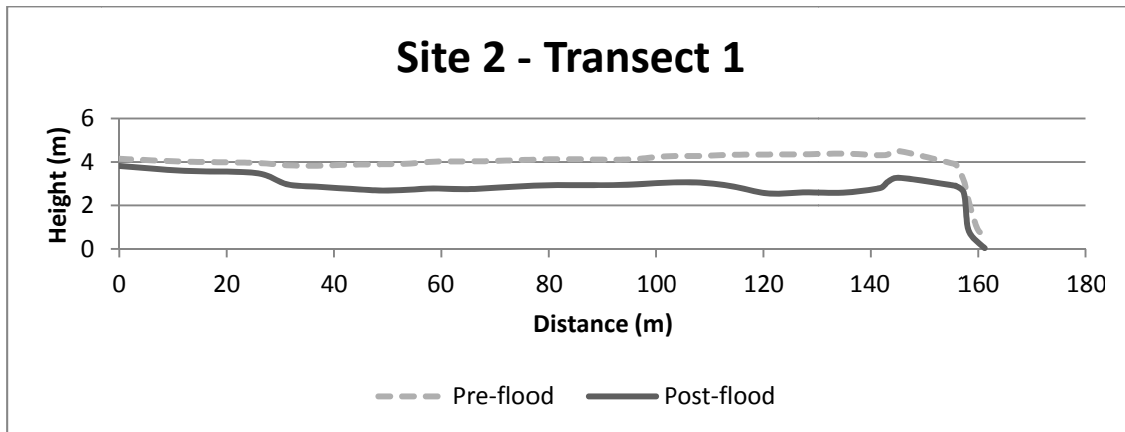
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BMRG project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion, replanting was not undertaken and irrigation regime is unknown.

## Transect 1

### Transect Data

Segment	1	2	3	4	5	TOTAL
Length (m)	12	13.5	88.4	42	5.3	161.2
Slope (%)	2	1	1	<1	53	
Feature	Paddock	Track	Riparian	Riparian	Riparian	
Soil Texture	FSL	FSL	FSL-FSCL	FSCL	SLC	
Bare ground	100%	99%	99%	100%	100%	
Weeds	Absent	Present	Present	Present	Present	
Debris	Absent	Absent	Present	Absent	Absent	
Natural trees	0	0	40	20	3	63
Planted trees	0	1	104	37	0	142

### Cross-section



### Photo



**PHOTO:** K2R14(i)

Photo taken at Segment 4 of Transect 1, looking south (downslope) towards the river.

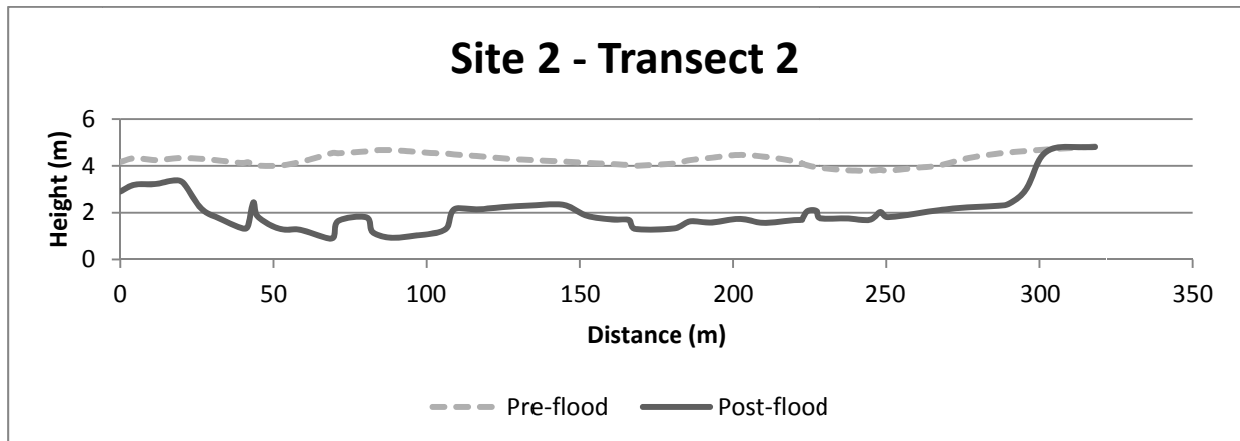
Date: 20/06/2014

## Transect 2

### Transect Data

Segment	1	2	3	4	5	6	7	8	TOTAL
Length (m)	20.6	22.8	65.5	57	82	47.7	6.9	15.5	318
Slope (%)	2	4	1	1	<1	2	24	1	
Feature	Riparian	Riparian	Channel	Channel	Channel	Channel	Cane	Cane	
Soil Texture	FSL-FSCL	FSL-FSCL	LS-FSCL	FSCL-LS	SL-FSCL	S-SL	S	S	
Bare ground	93%	95%	95%	95%	98%	75-45%	20%	20%	
Weeds	Present	Present	Present	Present	Present	Absent	Absent	Absent	
Debris	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	
Natural trees	3	25	37	12	10	16	0	0	103
Planted trees	34	16	0	54	0	33	0	0	137

### Cross-section



### Photo



**PHOTO:** K2R22(i)

Photo taken at Segment 2 of Transect 2, looking west along the Transect, across the eroded channel.

Date: 14/05/2014

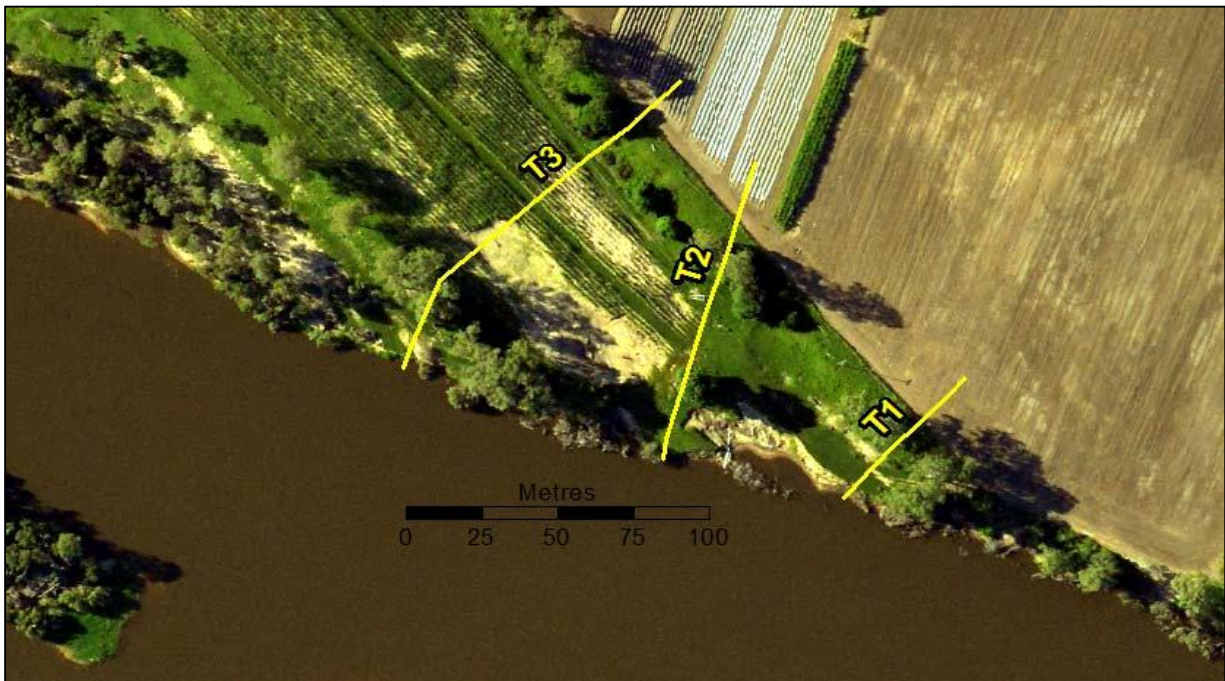


## Site 3 - Report Card

### Site Data

Locality	Bundaberg	Soil type (ASC)	Stratic Rudosol
River	Kolan River	Soil Profile Class	Burnett
Dist. from river mouth	20 m	Geology	Qa
Dist. from structure	22km UP; 3km DS	Regional Ecosystem	12.3.7b
Section of river	Outside bend	Erosion	Scouring & slumping
Bank height (ave)	9 m	Works	Revegetation
Bank length (ave)	100 m	Flood height (2013)	10.5m (LiDAR, AHD)
Bank slope class	Gently inclined	Mean annual rainfall	989 mm
Aspect	South-southwest	No. of Transects	3

### Post-Flood Image



### Site Photo



**PHOTO:** K3R1&2F

Photo shows general view of the revegetation area, at the base of Transects 1 and 2.

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Grazing	Horticulture & Grazing	Horticulture & Grazing
Pre-flood	Grazing	Horticulture & Grazing	Horticulture & Grazing
Current	T1 – Reveg, no grazing T2 – Grazing T3 - Grazing	Horticulture & Grazing	Horticulture & Grazing
Future	Grazing	Horticulture & Grazing	Horticulture & Grazing

## Pre-flood Management

Horticulture on upper slope; row direction same as slope (NE/SW). Phase of crop cycle (ie. fallow/crop) at time of flood unknown. Grazing on lower bank at rate of 3 head per hectare; unfenced prior to flood.

## Flood Damage

Flood waters covered 80% of property and rose to approximately 12m (landholder estimate) above revegetation site. Significant impacts on farm. Riverbank scouring at T1 and T2 and sand deposition at T3.

## Remedial Works

Remedial works in horticultural paddock on upper slopes undertaken by landholder (specific activity unknown). Remedial works at revegetation site on lower slope undertaken by BMRG and site fenced by landholder. No earthworks on lower slopes undertaken; revegetation at T1 and T2 only. Weed treatment included manual removal and spraying. No maintenance regime proposed, excepting temporary exclusion of cattle from revegetation site.

## Maintenance

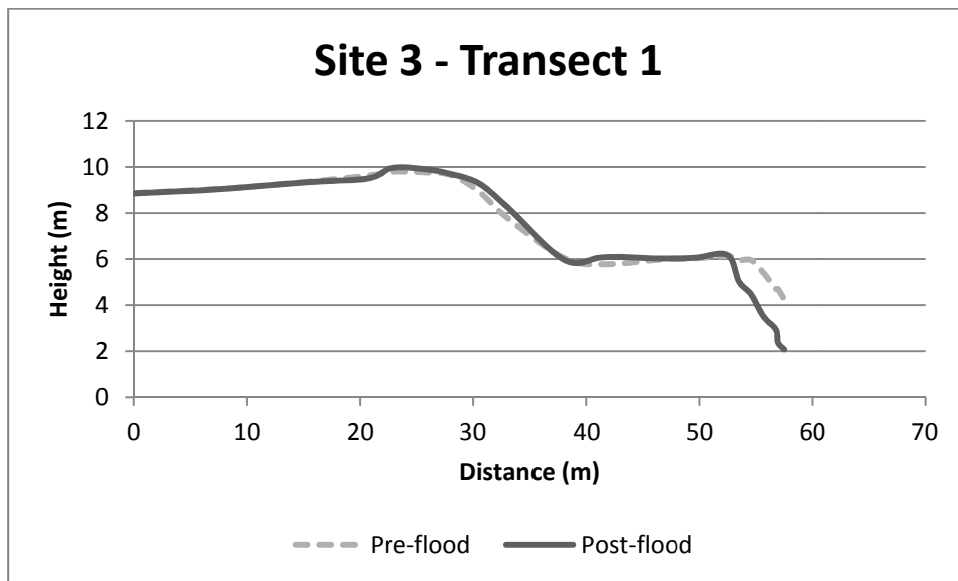
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BMRG project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion, replanting was not undertaken and irrigation regime is unknown.

## Transect 1

### Transect Data

Segment	1	2	3	4	5	6	TOTAL
Length (m)	22.8	5.27	10.01	8.6	5.77	4.85	57.31
Slope (%)	5	5	37	1	3	85	
Feature	Crop/Track	Riparian	Riparian	Riparian	Riparian	Riparian	
Soil Texture	LS	CS	LS	KS	S	LS	
Bare ground	0%	0%	0%	5%	10%	25%	
Weeds	Present	Present	Present	Present	Absent	Present	
Debris	Absent	Absent	Absent	Absent	Absent	Present	
Natural trees	0	0	1	1	0	2	4
Planted trees	0	0	0	0	18	2	20

### Cross-section



### Photo



**PHOTO:** K3R13(i)

Photo taken at Segment 3 of Transect 1, looking along transect (downslope) towards the river.

Date: 15/05/2014

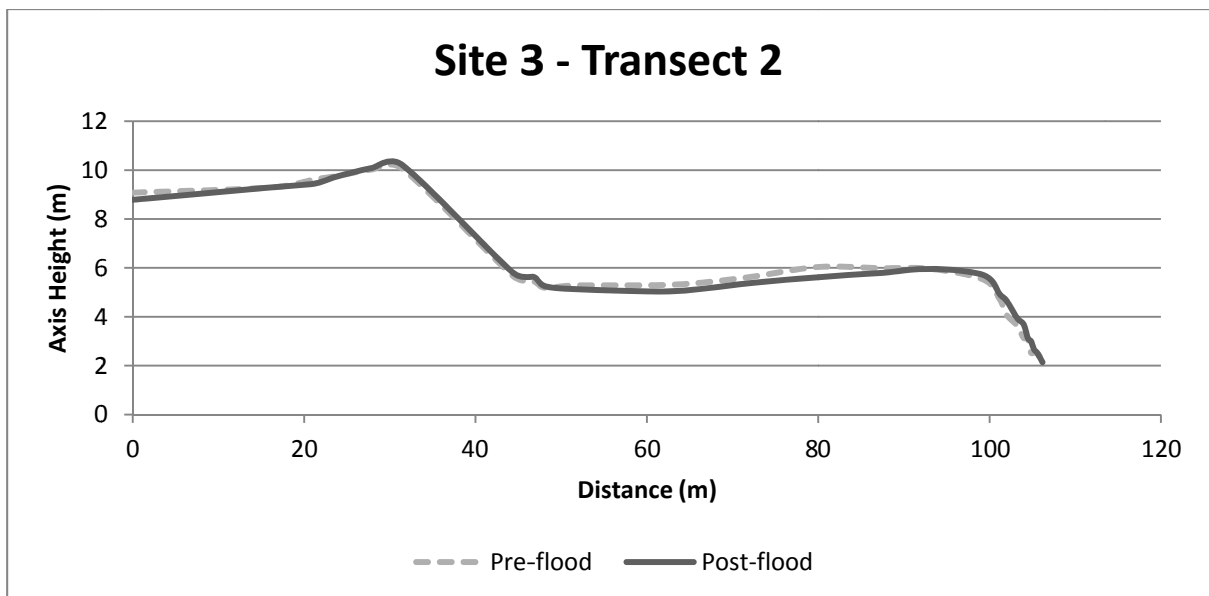


## Transect 2

### Transect Data

Segment	1	2	3	4	5	6	7	TOTAL
Length (m)	23.69	7.69	12.99	7.25	28.3	19.31	6.79	106.02
Slope (%)	4	6	34	9	2	<1	53	
Feature	Fallow/track	Riparian	Riparian	Grass	Crop	Riparian	Riparian	
Soil Texture	LS	CS-SL	SL-SCL	SL	LS	LS	LS	
Bare ground	75%	20%	20%	15	50%	30%	15%	
Weeds	Present	Present	Present	Present	Absent	Present	Absent	
Debris	Absent	Absent	Absent	Absent	Absent	Absent	Present	
Natural trees	0	0	4	0	0	1	8	13
Planted trees	0	0	0	0	0	32	9	41

### Cross-section



### Photo



**PHOTO:** K3R23(i)

Photo taken at Segment 3 of Transect 2, looking along transect (downslope) towards the river.

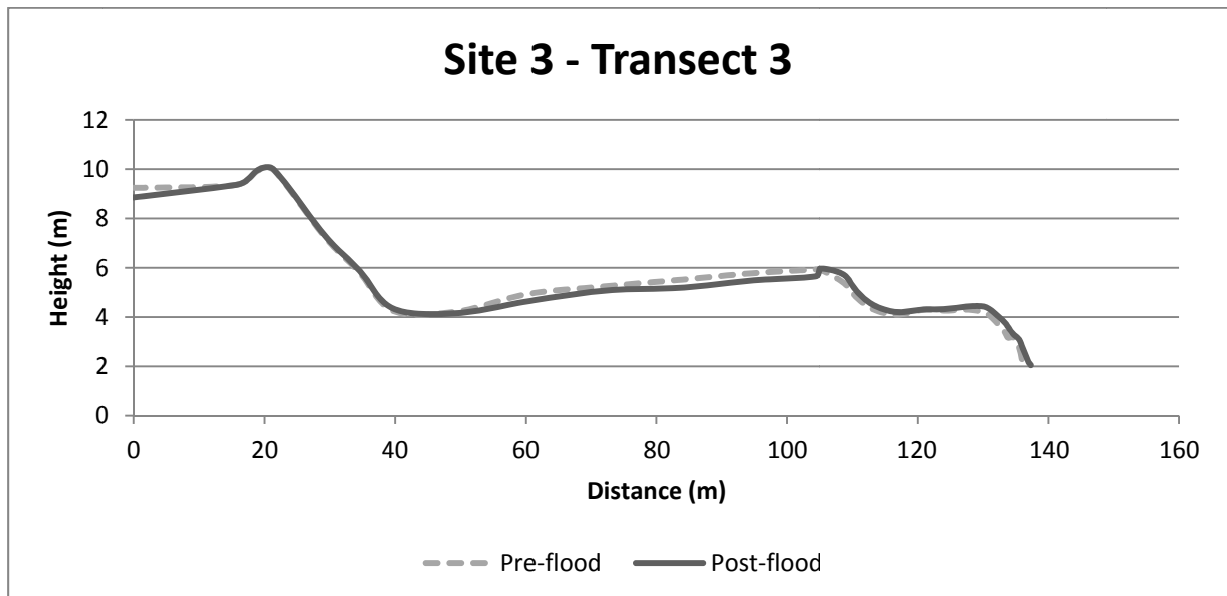
Date: 15/05/2014

## Transect 3

### Transect Data

Segment	1	2	3	4	5	6	TOTAL
Length (m)	19.02	2.44	17.56	65.37	25.8	6.2	136.39
Slope %	6	0	32	2	6	36	
Feature	Fallow/track	Grass	Grass	Crop	Riparian	Riparian	
Soil Texture	LS	SL	SL-SCL	S-LS	S	S	
Bare ground	75%	25%	20%	50%	25%	25%	
Weeds	Absent	Present	Present	Absent	Absent	Present	
Debris	Absent	Absent	Absent	Absent	Absent	Absent	
Natural trees	0	0	5	0	6	1	12
Planted trees	0	0	1	0	0	0	0

### Cross-section



### Photo



**PHOTO:** K3N35(iii)

Photo taken at Segment 5 of Transect 3, looking along transect (upslope) towards the start.

Date: 15/05/2014

## Site 4 – Report Card

### Site Data

Locality	Gayndah	Soil type (ASC)	Stratic Rudosol
River	Upper Burnett	Soil Profile Class	Burnett
Dist. from river mouth	180	Geology	Qa
Dist. from structure	19km US & 54km DS	Regional Ecosystem	12.3.7/12.3.7b
Section of river	Straight	Erosion	Scouring
Bank height (ave)	94m	Works	Revegetation (LHEW)
Bank length (ave)	135m	Flood height (2013)	No LiDAR available
Bank slope class	Moderately inclined	Mean annual rainfall	611mm
Aspect	East	No. of Transects	3

### Post-Flood Image



### Site Photo



**PHOTO:** UB4S1B

Photo taken looking south across revegetation area at Transect 1.

Date: 19/05/2014

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Grazing	Citrus orchard	Citrus & grazing
Pre-flood	Grazing	Citrus orchard	Citrus & grazing
Current	Nil	Citrus orchard	Citrus & grazing
Future	Grazing (controlled)	Citrus orchard	Citrus & grazing

## Pre-flood Management

Citrus orchard on upper bank with rows running NW/SE in direction of slope at T1 and T2, but running N/S perpendicular to slope at T3. Riparian area fenced, but grazed (stocking rate unknown).

## Flood Damage

Floodwaters covered approximately 2% of the total farm, reaching approximately 18m at the gauging station and approximately 20-25m in low spots causing riverbank slumping at T1 and scouring at T2 and T3. (NB. Floodwaters reached >2m at Barambah Creek).

## Remedial Works

Earthworks and groundcover (Rhodes grass) planting were carried out by the landholder in February 2014 and the riparian zone surrounding the monitoring site was re-fenced two weeks later. Revegetation was completed in March 2014 and the plants irrigated to assist establishment (duration unknown). Other unfenced sections of the riparian zone on the property will be fenced in the future (location and timing unknown). The revegetation site will be grazed by three horses and management of the citrus orchard will continue unchanged. No maintenance regime planned.

## Maintenance

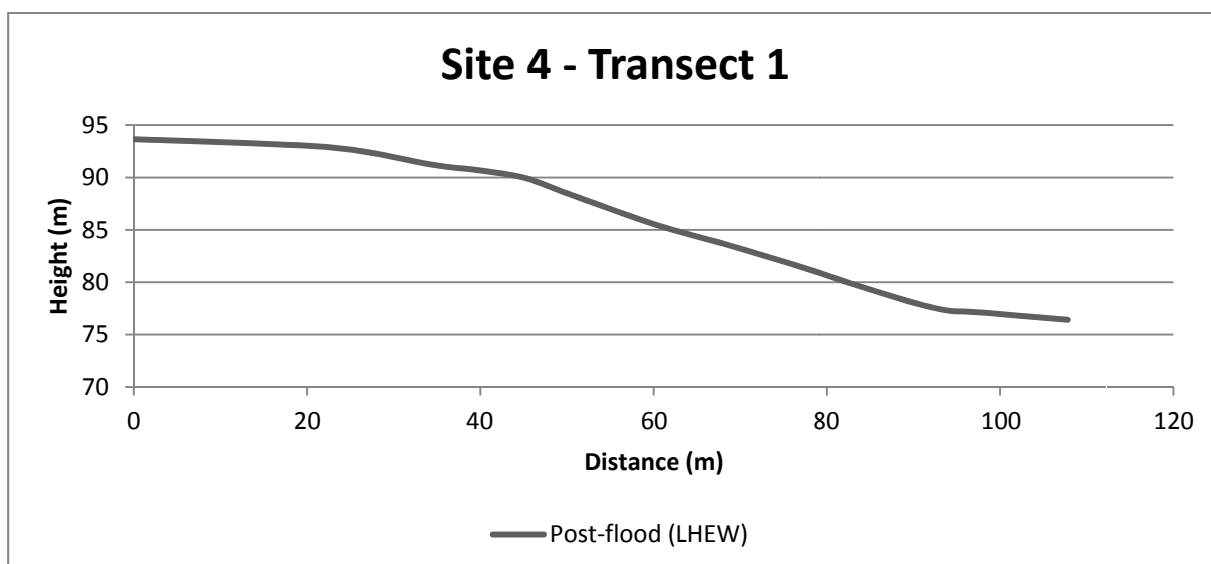
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BCCA project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion, replanting (~20% of seedlings) was undertaken. Irrigation regime is unknown.

## Transect 1

### Transect Data

Segment	1	2	3	4	5	TOTAL
Length (m)	12.05	19.55	28.64	29.65	14.87	107.76
Slope (%)	3	10	23	25	7	
Feature	Orchard	Track	Riparian	Riparian	Riparian	
Soil Texture	LS	FSL-ZCL	LS	FSL	LS	
Bare ground	90%row/20%int	35%	45%	25%	15%	
Weeds	Absent	Absent	Absent	Absent	Present	
Debris	Absent	Absent	Absent	Present	Present	
Natural trees	0	0	6	10	63	79
Planted trees	0	0	13	15	8	36

### Cross-section



### Photo



**PHOTO:** UB4R14(i)

Photo taken at Segment 4 of Transect 1 looking (downslope) towards river, across revegetated area.

Date: 19/05/2014

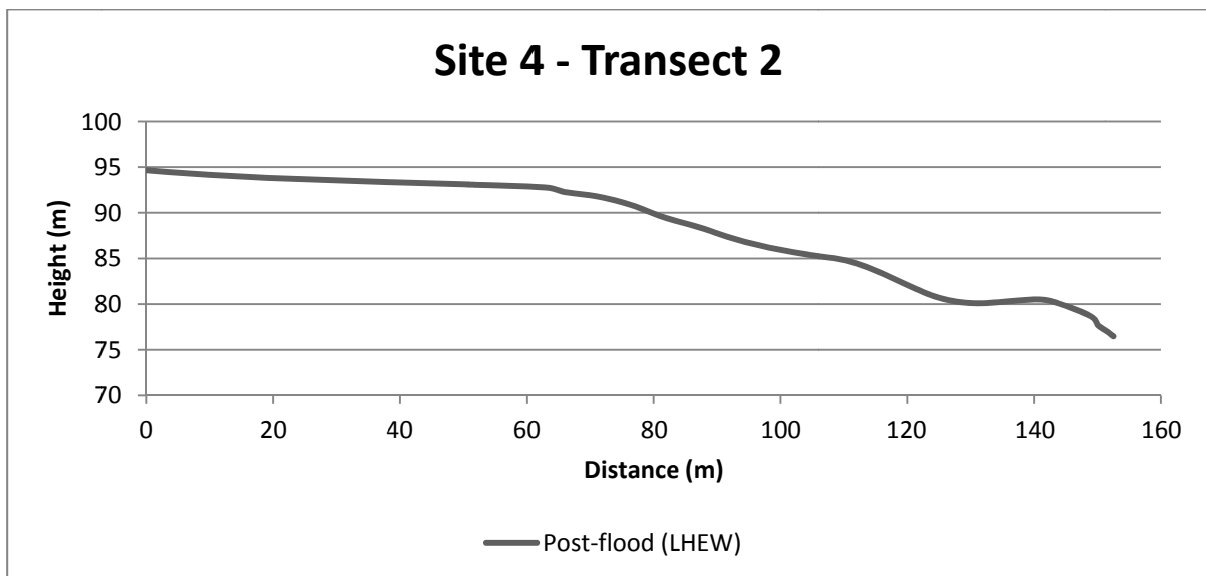


## Transect 2

### Transect Data

Segment	1	2	3	4	5	6	TOTAL
Length (m)	50.69	15.28	44.98	14.35	14.54	12.24	152.08
Slope (%)	3	5	26	28	1	33	
Feature	Orchard	Track	Riparian	Riparian	Riparian	Riparian	
Soil Texture	LS	FSL	SL	LS-ZCL	SCL	S	
Bare ground	90%row/20%int	15%	25%	20%	20	20	
Weeds	Absent	Absent	Absent	Absent	Present	Present	
Debris	Absent	Absent	Absent	Absent	Absent	Present	
Natural trees	0	0	0	4	2	6	12
Planted trees	0	0	0	0	9	4	13

### Cross-section



### Photo



**PHOTO:** UB4S2D

Photo taken looking (upslope) diagonally across Transect 2.

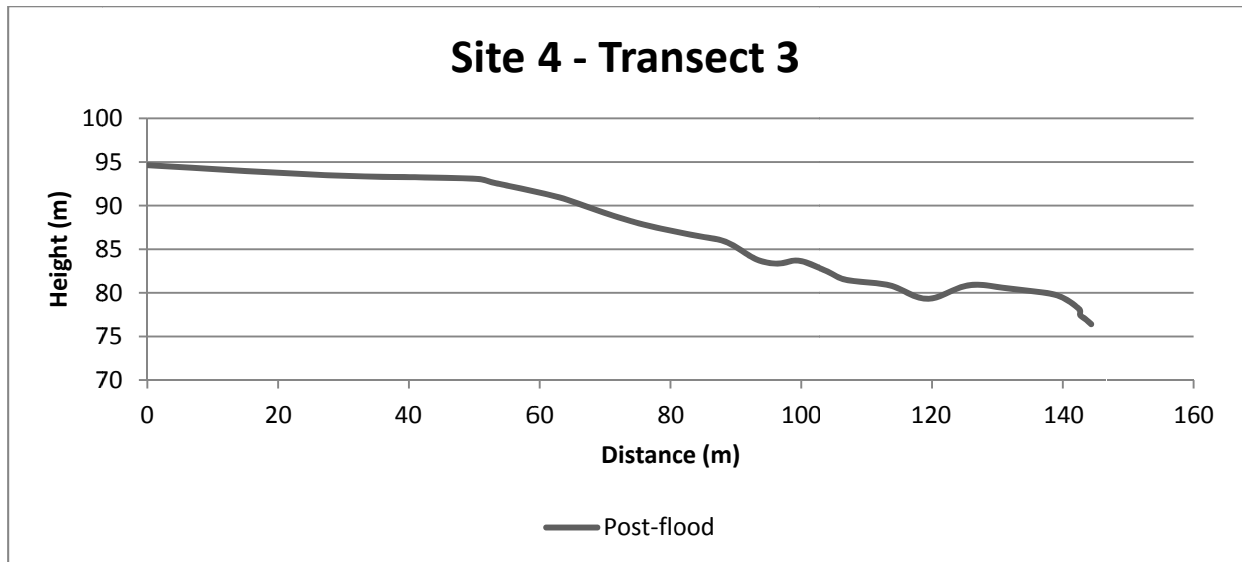
Date: 19/05/2014

## Transect 3

### Transect Data

Segment	1	2	3	4	5	6	TOTAL
Length (m)	41.7	11.23	35.54	18.17	36.92	1.0	144.56
Slope	3	6	19	24	6	64	
Feature	Orchard	Track	Riparian	Riparian	Riparian	Riparian	
Soil Texture	FSCl	FSCl	LS-SL	LS-SCL	LS_SCL	SL	
Bare ground	85row/20int	15%	40%	20%	35%	60%	
Weeds	Absent	Absent	Absent	Present	Present	Present	
Debris	Absent	Absent	Absent	Absent	Present	Present	
Natural trees	0	0	0	3	6	7	16
Planted trees	0	0	0	0	0	0	0

### Cross-section



### Photo



**PHOTO:** UB4N33(i)

Photo taken at Segment 3 of Transect 3 looking (downslope) towards river.

Date: 19/05/2014

## Site 5 - Report Card

### Site Data

Locality	Mundubbera	Soil type (ASC)	Stratic Rudosol
River	Upper Burnett River	Soil Profile Class	Burnett
Dist. from river mouth	240 km	Geology	Qa
Dist. from structure	56 US; 5km DS	Regional Ecosystem	11.5.25/11.3.4
Section of river	Straight	Erosion	Scouring & slumping
Bank height (ave)	142m	Works	Earthworks & reveg
Bank length (ave)	59m	Flood height (2013)	128m
Bank slope class	Moderately inclined	Mean annual rainfall	705mm
Aspect	South	No. of Transects	4

### Post-Flood Image



### Site Photo



**PHOTO:** UB5N14(iv)

Photo taken at Segment 4 of Transect 1 looking east (across slope).

Date: 21/05/2014



## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Intermittent grazing	Citrus orchard	Grazing
Pre-flood	Nil	Citrus orchard	Grazing
Current	Nil	Citrus orchard	Grazing
Future	Intermittent grazing	Citrus orchard	Grazing

## Pre-flood Management

Area above the riparian zone is a citrus orchard, with rows running E/W, perpendicular to slope. Grazing paddocks located in wider area. Riparian zone fenced, but subject to intermittent grazing (stocking rates unknown).

## Flood Damage

Floodwaters covered approximately 95% of the citrus orchard. Pump site and infrastructure were lost/damaged, as well as some irrigation equipment. Approximately 1000 citrus trees were pushed over (and stood up post flood). Significant slumping occurred along the river bank, including at site T2, T3 and T4.

## Remedial Works

No remedial works were undertaken by the landholder prior to BRMG project. Earthworks were completed at site T2 and T4 in May 2014 and revegetation in August 2014. Farm management practices will not change and no site maintenance regime is planned.

## Maintenance

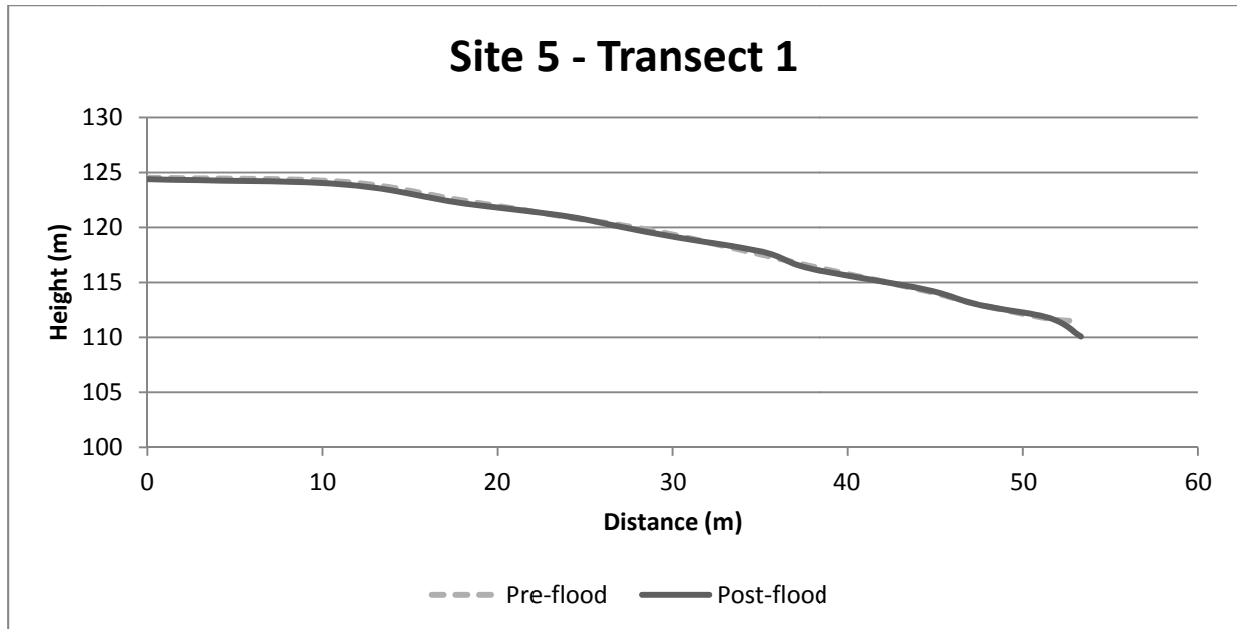
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BCCA project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion, replanting (i.e. due to seedling establishment failure) was not undertaken; however replanting is likely to be undertaken prior to completion of BCCA project. Irrigation regime is unknown.

## Transect 1

### Transect Data

Segment	1	2	3	4	TOTAL
Length (m)	11.1	23.9	9.3	8.7	53
Slope (%)	4	26	37	49	
Feature	Orchard & Track	Riparian	Riparian	River's edge	
Soil Texture	LS	SCL	LS-FSCL	FSL	
Bare ground	70%row/30%int	5%	5%	5%	
Weeds	Absent	Absent	Present	Present	
Debris	Absent	Present	Present	Present	
Natural trees	0	3	0	5	8
Planted trees	0	0	0	0	0

### Cross-section



### Photo



**PHOTO:** UB5S1A

Photo taken from edge of riparian area (also break of slope) in Segment 2 of Transect 1, looking (downslope) towards river.

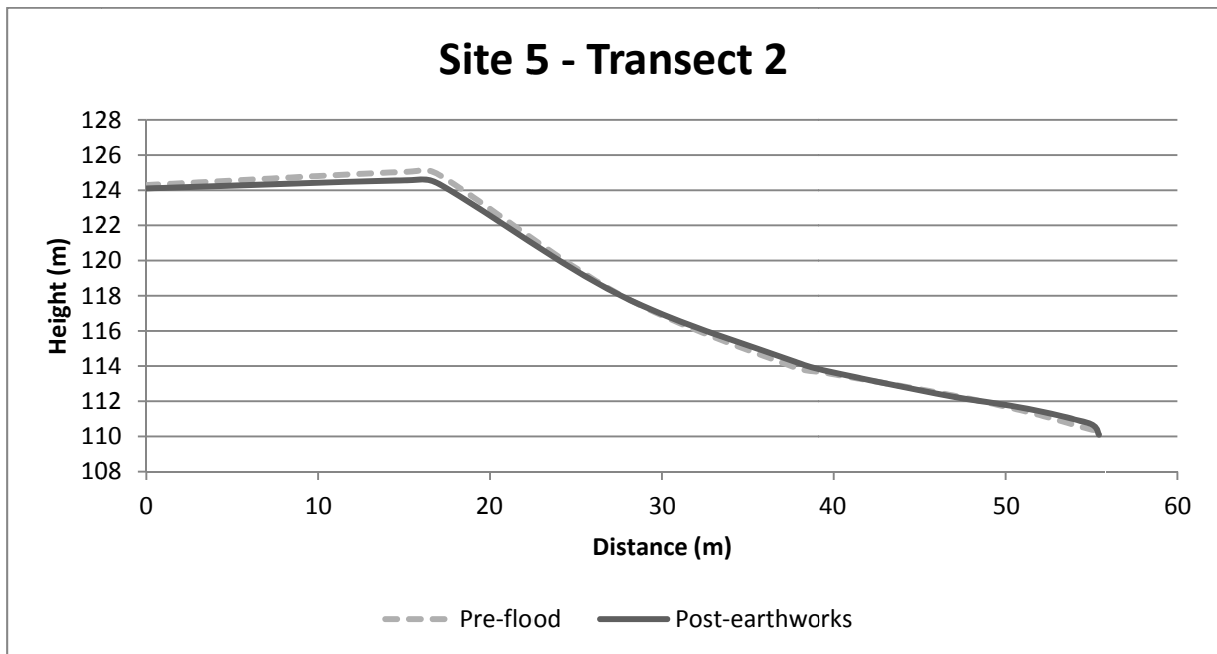
Date: 21/05/2014

## Transect 2

### Transect Data

Segment	1	2	3	4	TOTAL
Length (m)	15.1	12.5	27.7	0	55.3
Slope (%)	3	52	29	~Vertical	
Feature	Orchard & Track	Riparian	Riparian	River's edge	
Soil Texture	SL	SL-	SCL-	FSL	
Bare ground	75%row/20%int	75%	10%	15%	
Weeds	Absent	Present	Present	Present	
Debris		Present	Present	Present	
Natural trees	0	1	3	5	9
Planted trees	0	8	0	0	8

### Cross-section



### Photo



**PHOTO:** UB6N14(ii)

Photo taken in Segment 4 of Transect 2, looking upslope along transect.

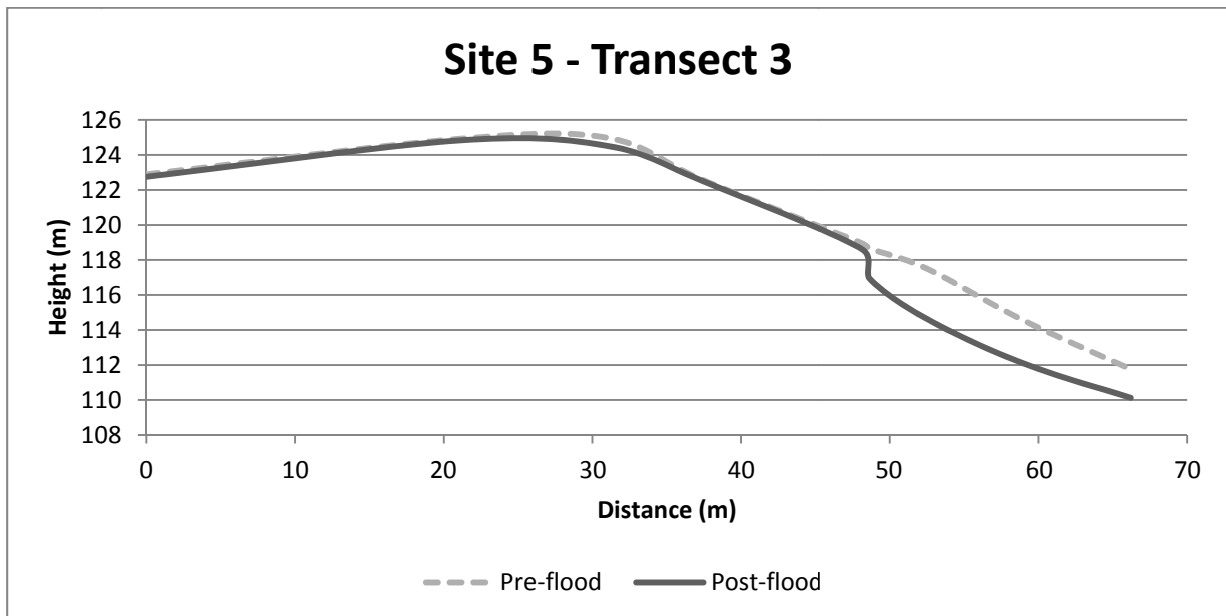
Date: 04/09/2014

## Transect 3

### Transect Data

Segment	1	2	3	4	TOTAL
Length (m)	21.2	9.9	17	17.9	66
Slope (%)	10	3	34	48	
Feature	Orchard & Track	Depression	Riparian	Slump to river	
Soil Texture	SL	SL	SCL	LS	
Bare ground	0%row/100%int	15%	5%	40-70%	
Weeds	Absent	Present	Present	Present	
Debris	Present (in trees)	Absent	Present	Present	
Natural trees	0	0	0	1	1
Planted trees	0	0	0	0	0

### Cross-section



### Photo



**PHOTO: UB5S3A**

Photo taken at edge of riparian area (also break of slope) at Segment 3 of Transect 3, looking (downslope) towards river.

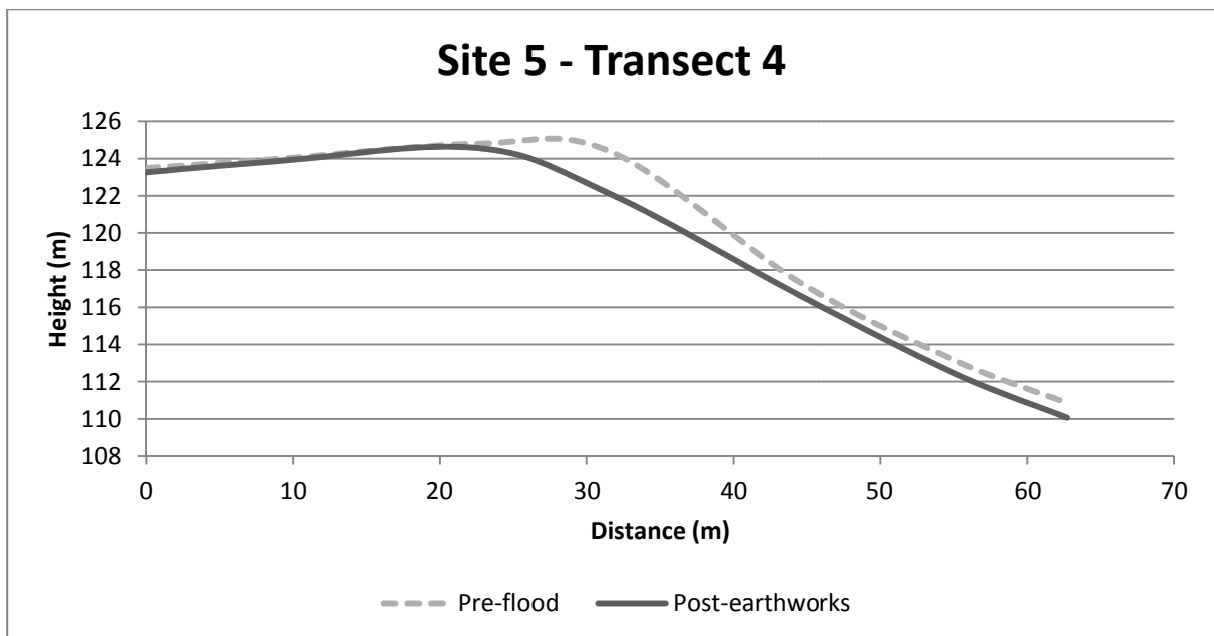
Date: 21/05/2014

## Transect 4

### Transect Data

Segment	1	2	TOTAL
Length (m)	22.6	40.1	62.7
Slope (%)	6	36	
Feature	Orchard & Track	Earthworks bank	
Soil Texture	LS	FSL	
Bare ground	80%row/20%int	75%	
Weeds	Absent	Absent	
Debris	Absent	Present	
Natural trees	0	2	2
Planted trees	0	18	18

### Cross-section



### Photo



#### PHOTO: UB5S4A

Photo taken at edge of replanted riparian area (also break of slope) at Segment 2 of Transect 4, looking (downslope) towards river. Post-earthworks and replanting.

Date: 04/09/2014

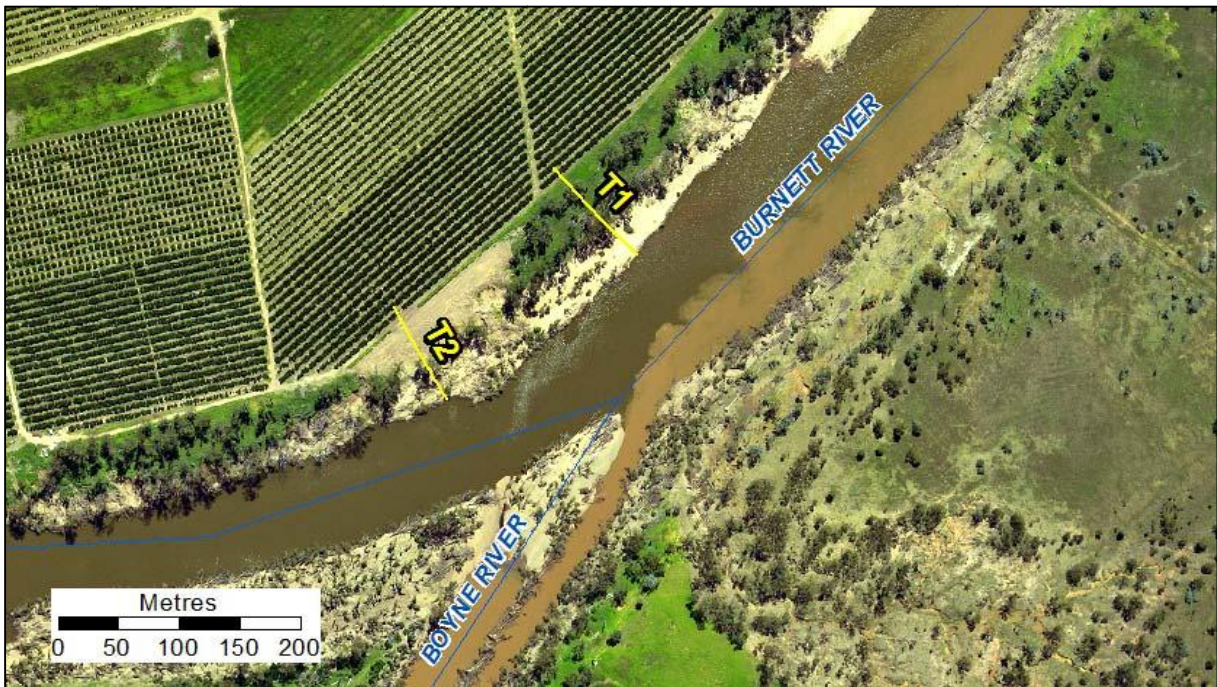


## Site 6 - Report Card

### Site Data

Locality	Mundubbera	Soil type (ASC)	Stratic Rudosol
River	Upper Burnett River	Soil Profile Class	Burnett
Dist. from river mouth	245km	Geology	Qa
Dist. from structure	51km US; 10km DS	Regional Ecosystem	113.25/11.3.4
Section of river	Inside bend	Erosion	Souring & slumping
Bank height (ave)	127m	Works	Revegetation (LHEW)
Bank length (ave)	96m	Flood height (2013)	130m (LiDAR, AHD)
Bank slope class	Moderately inclined	Mean annual rainfall	705mm
Aspect	Southeast	No. of Transects	2

### Post-Flood Image



### Site Photo



**PHOTO:** UB6N13(iv)

Photo taken at Segment 3 of Transect 1, looking northeast (across slope).

Date: 21/05/2014

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Intermittent grazing	Citrus orchard	Grazing
Pre-flood	Nil	Citrus orchard	Grazing
Current	Nil	Citrus orchard	Grazing
Future	Intermittent grazing	Citrus orchard	Grazing

## Pre-flood Management

Area above the riparian zone is a citrus orchard, with rows running perpendicular to slope. Grazing paddocks located in wider area. Riparian zone fenced, but subject to intermittent grazing (stocking rates unknown).

## Flood Damage

Floodwaters covered approximately 95% of the citrus orchard, reaching to approximately halfway through the third block of citrus from the river. Significant slumping and scouring and sand deposition occurred along the river bank. Site T1 experienced sand deposition.

## Remedial Works

No remedial works were undertaken by the landholder prior to BRMG project. Some earthworks were undertaken along the riverbank, however not at either monitoring site. Revegetation at site T2 was completed in August 2014. Farm management practices will not change and no site maintenance regime is planned.

## Maintenance

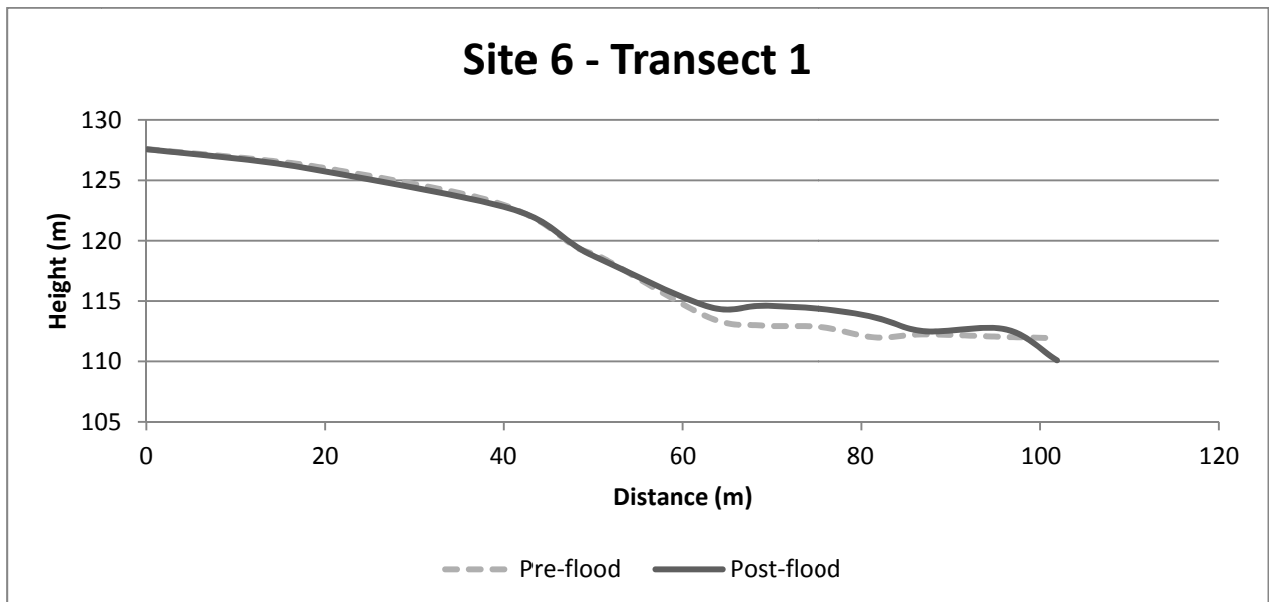
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BCCA project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion, replanting (i.e. due to seedling establishment failure) was not undertaken; however replanting is likely to be undertaken prior to completion of BCCA project. Irrigation regime is unknown.

## Transect 1

### Transect Data

Segment	1	2	3	4	5	TOTAL
Length (m)	16.9	26.3	19.6	33.2	5.8	101.8
Slope (%)	9	15	38	6	45	
Feature	Orchard & Track	Riparian	Riparian	Riparian / Sand	Riparian	
Soil Texture	SL	ZCL	ZCL	KS	KS	
Bare ground	40%row/20%int	0%	0%	0-100%	40-90%	
Weeds	Absent	Absent	Present	Absent	Present	
Debris	Absent	Present	Present	Present	Absent	
Natural trees	0	19	20	13	10	62
Planted trees	0	0	0	0	0	0

### Cross-section



### Photo



**PHOTO:** UB6S1A

Photo taken at edge of riparian area (also break of slope) at Segment 2 of Transect 1, looking (downslope) towards river.

Date: 21/05/2014

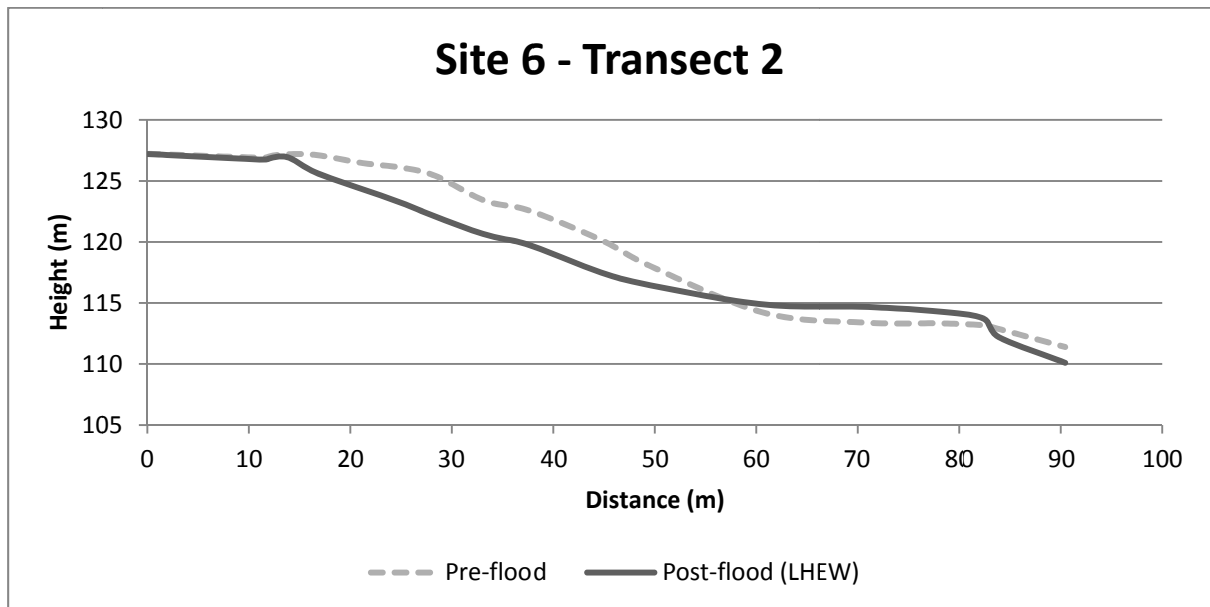


## Transect 2

### Transect Data

Segment	1	2	3	4	TOTAL
Length (m)	12.1	37	32.6	8	89.7
Slope (%)	3	28	8	45	
Feature	Orchard & Track	Riparian	Riparian / Track	Riparian	
Soil Texture	SL	ZCL	SL	S	
Bare ground	0%row/0%int	40%	50%	80%	
Weeds	Present	Present	Present	Present	
Debris	Absent	Present	Present	Present	
Natural trees	0	105	1	46	152
Planted trees	0	0	6	0	6

### Cross-section



### Photo



**PHOTO:** UB6S2A

Photo taken from edge of riparian area (also break of slope) at Segment 2 of Transect 2, looking (downslope) towards river.

Date: 04/09/2014

## Site 7 - Report Card

### Site Data

Locality	Bundaberg	Soil type (ASC)	Stratic Rudosol / Brown Dermosol
River	Lower Burnett River	Soil Profile Class	Burnett
Dist. from river mouth	89 km	Geology	Qa
Dist. from structure	39km US; 17km DS	Regional Ecosystem	12.3.7
Section of river	Outside bend	Erosion	Slumping
Bank height (ave)	35 m	Works	Revegetation
Bank length (ave)	137 m	Flood height (2013)	38m / 37m (LiDAR, AHD)
Bank slope class	Moderately inclined	Mean annual rainfall	756 mm
Aspect	South	No. of Transects	2

### Post-Flood Image



### Site Photo



**PHOTO:** UB7R14(iv)

Photo taken at Segment 4 of Transect 1, looking east along edge of slump.

Date: 13/11/2014

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Citrus orchard	Citrus orchard	Horticulture/Cropping
Pre-flood	Citrus orchard	Citrus orchard	Horticulture/Cropping
Current	Citrus orchard	Citrus orchard	Horticulture/Cropping
Future	Citrus orchard	Citrus orchard	Horticulture/Cropping

## Pre-flood Management

Land use on property is citrus orchard, with wider area including horticulture, cropping and some grazing. Citrus orchard (encompassing monitoring sites) is fenced to exclude livestock and rows run parallel to slope at T1 (E/W) and T2 (N/S).

## Flood Damage

Floodwaters covered approximately 60% of the property. Damage to irrigation, 6000 trees and fruit quality occurred, with debris deposition in crops. Significant riverbank slumping occurred at T1 and sand deposition at T2.

## Remedial Works

No earthworks were carried out and revegetation was completed at T1 in July 2014 and at T2 in September 2014. Management of citrus orchard will remain unchanged. Elsewhere on the property soil testing and earthworks have been undertaken (location not specified), as well as modifications to grazing practices. Post-flood weed treatment included manual removal and spraying.

## Maintenance

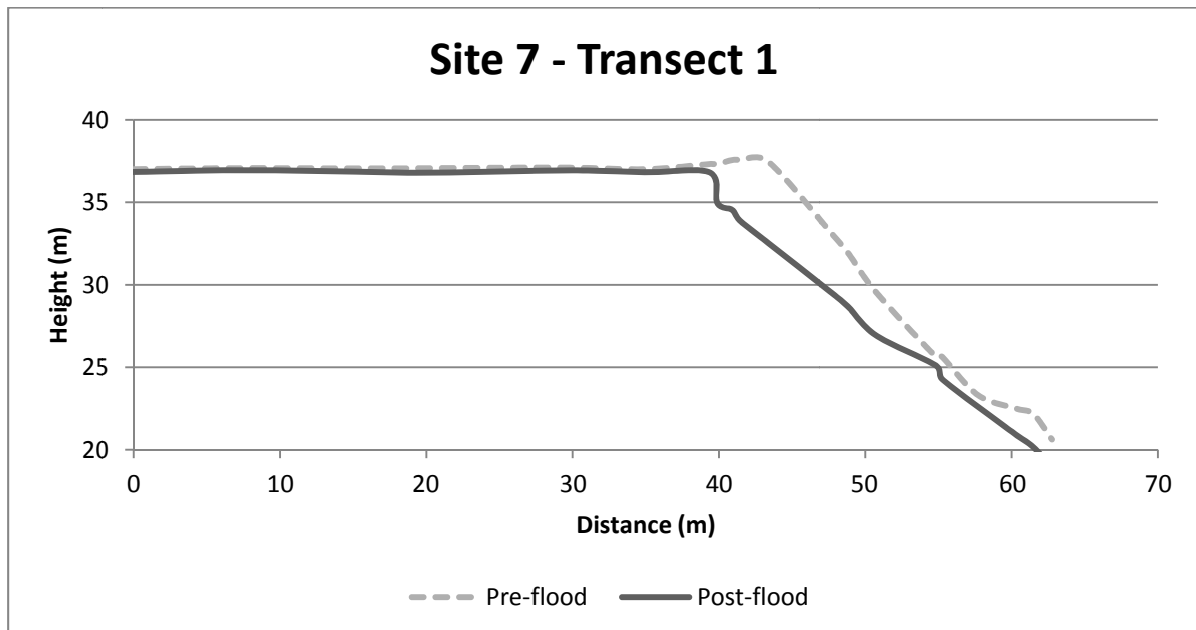
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BMRG project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion replanting was not undertaken and irrigation regime is unknown (although sprinklers have been set up at T2).

## Transect 1

### Transect Data

Segment	1	2	3	4	5	TOTAL
Length (m)	23.4	11.6	4.3	11	11.8	62.1
Slope (%)	<1	<1	90	68	-	
Feature	Orchard	Track	Riparian	Riparian	Riparian	
Soil Texture	SL	SL	SL	LS-SL	LS	
Bare ground	85%row/0%int	10%	20%	90%	80-20%	
Weeds	Absent	Absent	Present	Present	Present	
Debris	Absent	Absent	Absent	Present	Present	
Natural trees	0	0	0	13	26	39
Planted trees	0	0	29	0	0	29

### Cross-section



### Photo



**PHOTO:** UB7R15(iii)

Photo taken at Segment 5 of Transect 1, looking (upslope) along transect towards top of slump.

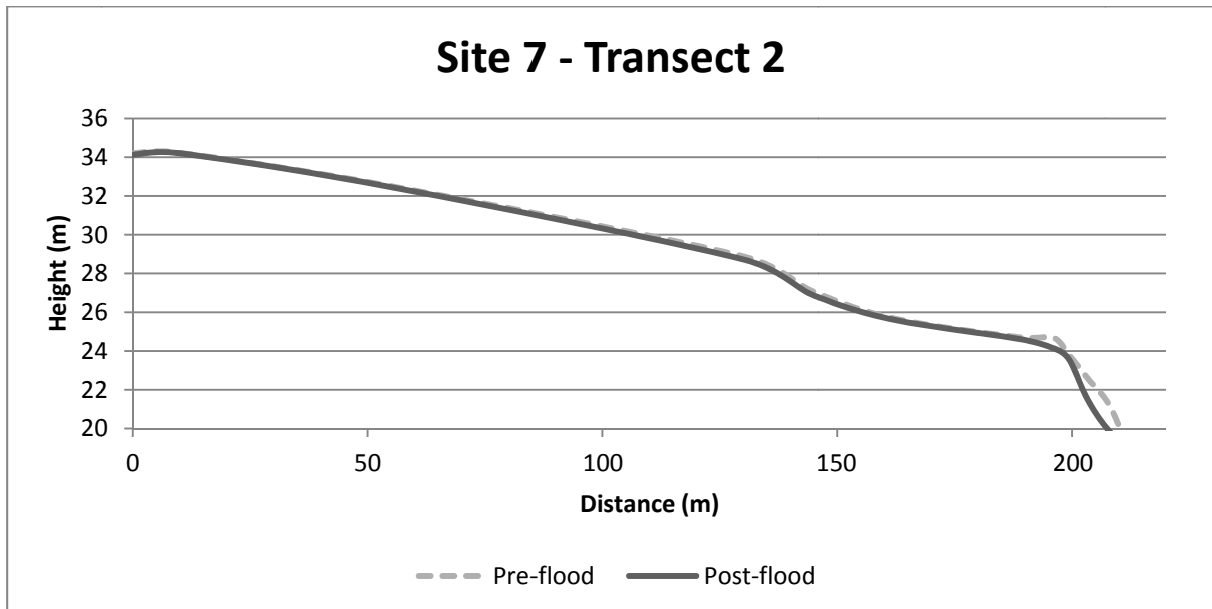
Date: 13/11/2014

## Transect 2

### Transect Data

Segment	1	2	3	TOTAL
Length (m)	190	10.4	12.5	212.9
Slope (%)	5	10	37	
Feature	Orchard	Riparian	Riparian	
Soil Texture	LS	LS-SL	LS-SL	
Bare ground	85%row/10%int	0	0	
Weeds	Absent	Present	Present	
Debris	Absent	Absent	Present	
Natural trees	0	0	8	8
Planted trees	0	1	0	1

### Cross-section



### Photo



**PHOTO:** UB7R22(i)

Photo taken at Segment 2 of Transect 2, looking (downslope) towards river. Photo point is at edge of revegetation area.

Date: 13/11/2014



## Site 8 - Report Card

### Site Data

Locality	Gayndah	Soil type (ASC)	Stratic Rudosol
River	Upper Burnett	Soil Profile Class	Burnett
Dist. from river mouth	206m	Geology	Qha
Dist. from structure	30km US; 9km DS	Regional Ecosystem	11.3.25
Section of river	Outside bend	Erosion	Slumping
Bank height (ave)	110m	Works	Revegetation (LHEW)
Bank length (ave)	39m	Flood height (2013)	110m (LiDAR, AHD)
Bank slope class	Steep	Mean annual rainfall	615mm
Aspect	South	No. of Transects	2

### Post-Flood Image



### Site Photo



**PHOTO:** UB8S1&2E

Photo taken from opposite site of bank, looking north at Transects 1 and 2.

Date: 5/09/2014

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Grazing of riparian zone	Citrus orchard	Grazing
Pre-flood	Grazing of riparian zone	Citrus orchard	Grazing
Current	Grazing of riparian zone	Citrus orchard	Grazing
Future	Grazing of riparian zone	Citrus orchard	Grazing

## Pre-flood Management

Rows in citrus orchard closest to monitoring site run NW/SE at angle to slope (parallel to railway). Land use in wider area includes citrus and grazing. Prior to flood, riparian zone subject to grazing.

## Flood Damage

Floodwaters covered 75% of property (water through house approximately 0.5m high). Damage to infrastructure; and loss of equipment and 300 citrus trees. Significant slumping along riverbank (including both monitoring sites).

## Remedial Works

Earthworks were undertaken by the landholder in February 2014 and the area planted with lucerne and Rhodes grass. Project works at both sites included revegetation (completed in September 2014) and fencing of the immediate riparian zone (completed in October 2014, post-planting). Other works included spraying Parthenium and fertiliser application. Some post-planting irrigation was carried out.

## Maintenance

Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BCCA project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion, replanting (~20% of seedlings) was undertaken. Irrigation regime is unknown.

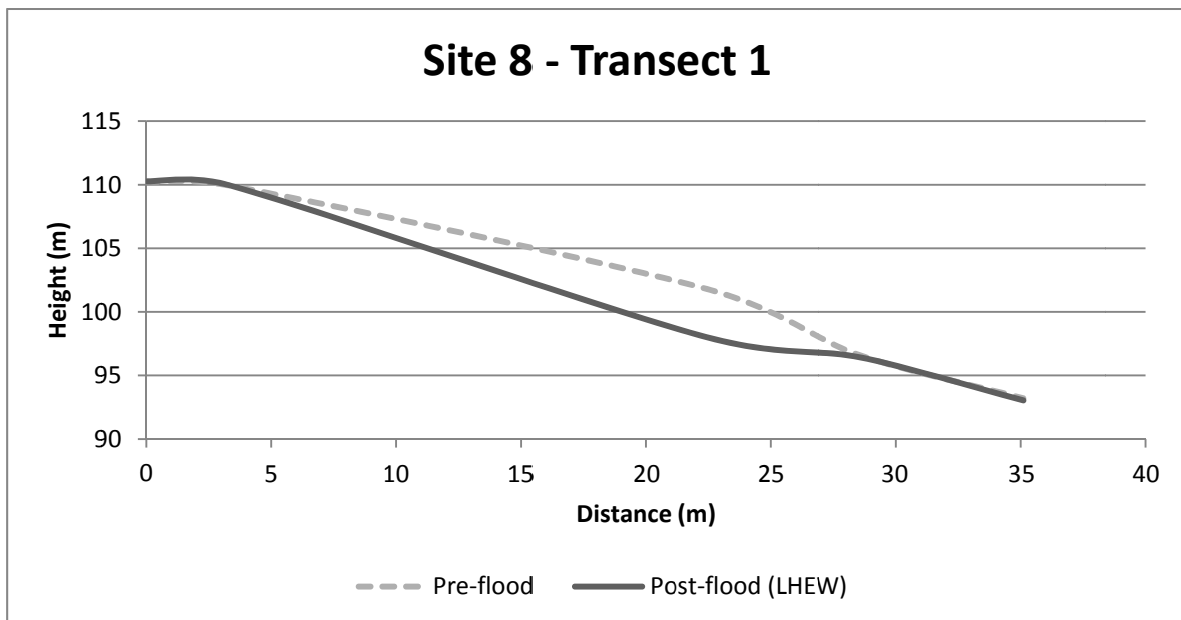
## Transect 1

### Transect Data

Segment	1	2	3	4	TOTAL
Length	6.2	18.9	3.1	9.8	38
Slope (%)	1	63	67	30	
Feature	Yard	Riparian	Riparian	Riparian	
Soil Texture	LS	LS	SL	S	
Bare ground	10%	60%	85%	80%	
Weeds	Absent	Absent	Present	Present	
Debris	Absent	Absent	Present	Present	
Natural trees	0	0	19	51	70
Planted trees	2	7	2	1	12

Note: Discrepancy between transect lengths shown in cross-section and on report card is due to different starting positions at top of bank. Slope trend shown is accurate.

### Cross-section



### Photo



**PHOTO:** UB8R14(iii)

Photo taken at Segment 4 of Transect 1, looking (upslope) north along transect.

Date: 5/09/2014



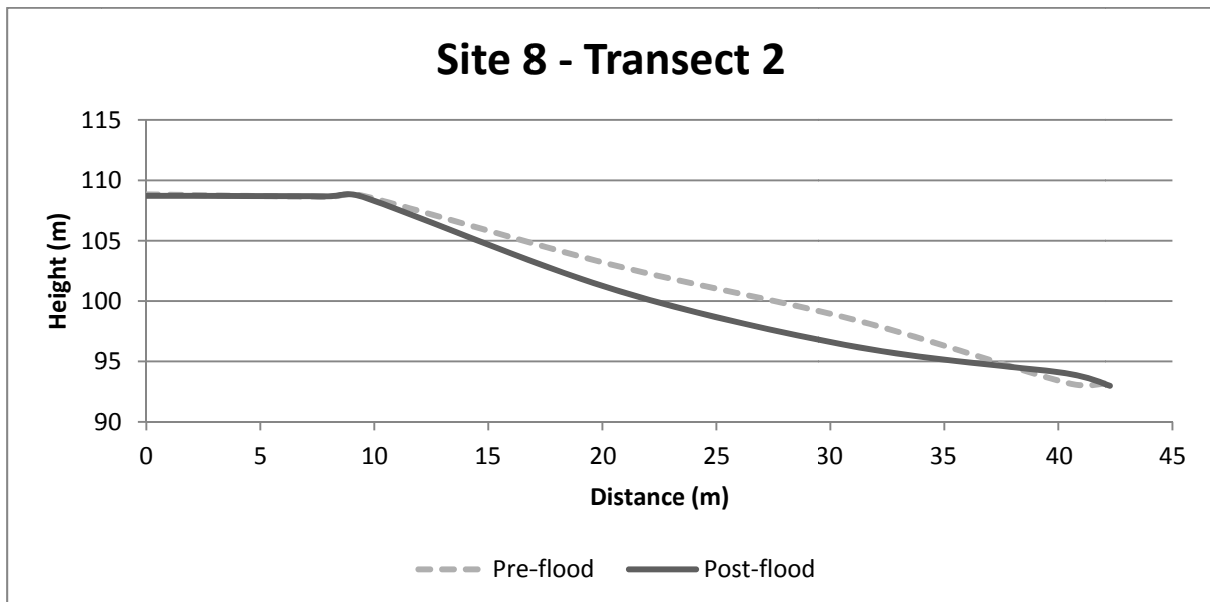
## Transect 2

### Transect Data

Segment	1	2	3	4	TOTAL
Length	9.5	14.8	7.1	9.4	40.8
Slope (%)	1	65	39	24	
Feature	Track	Riparian	Riparian	Riparian	
Soil Texture	LS	LS	LS-SL	LS	
Bare ground	30%	80%	85%	65%	
Weeds	Absent	Present	Present	Present	
Debris	Absent	Present	Present	Present	
Natural trees	0	0	56	52	108
Planted trees	0	4	0	0	4

**Note:** Discrepancy between transect lengths shown in cross-section and on report card is due to different starting positions at top of bank. Slope trend shown is accurate.

### Cross-section



### Photo



**PHOTO:** UB8R24

Photo taken from Segment 4 of Transect 2, at the water's edge, looking north (upslope) along transect.

Date: 5/09/2014

## Site 9 - Report Card

### Site Data

Locality	Bundaberg	Soil type (ASC)	Stratic Rudosol
River	Lower Burnett River	Soil Profile Class	Burnett
Dist. from river mouth	63	Geology	Qa
Dist. from structure	10km US; 33km DS	Regional Ecosystem	12.3.1
Section of river	Drainage line (inside bend)	Erosion	Slumping
Bank height (ave)	27 m	Works	Earthworks & reveg
Bank length (ave)	62 m	Flood height (2013)	28 m (LiDAR, AHD)
Bank slope (ave)	Moderately inclined	Mean annual rainfall	860 mm
Aspect	Northwest	No. of Transects	1

### Post-Flood Image



### Site Photo



**PHOTO:** UB9S1C

Photo taken from northern side of site, looking south across the site.

Date: 13/11/2014

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Sugarcane Tree nuts Hay	Mixed farming Rural residential	Sugarcane Cattle
Pre-flood			
Current			
Future			

## Pre-flood Management

Some bank slumping had occurred prior to 2012 flood, without remediation. Site immediately surrounded by native vegetation, except for hay paddock on western side and sugarcane paddock to the SW. The riparian zone is not fenced as cattle are not on the property. (Grazing history unknown).

## Flood Damage

Floodwaters covered approximately 15-20% of the farm, reaching an estimated 29.5m. Water levels rose over 2 days, but fell quickly. Impacts included extensive sand deposition along the inside river bend to the north of the site, severe bank slumping at the site, and loss of farm equipment.

## Remedial Works

Temporary landholder earthworks were undertaken to construct a check bank along the top of the slump (for safety purposes) prior to commencement of the project. Project earthworks included formalisation of the bank (to create 1:2 batter) and revegetation (both completed in October 2014). A permanent check bank was also constructed at the top of the slope, immediately above the access track. Plants were irrigated to aid establishment (duration unknown). Weed control included spot spraying, however no maintenance regime planned. Note: at time of survey, some erosion gullies had started to form on the bank.

## Maintenance

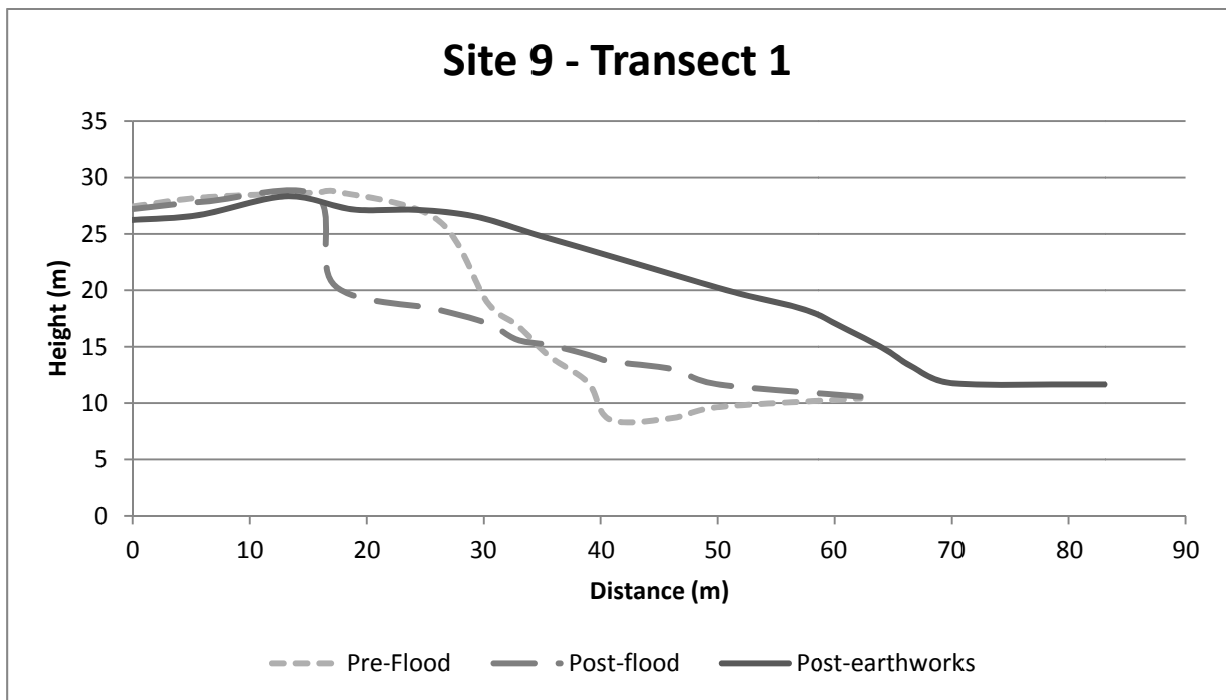
Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BMRG project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Prior to SEME project completion replanting was not undertaken and irrigation regime is unknown.

## Transect 1

### Transect Data

Segment	1	2	TOTAL
Length (m)	22.4	62.1	84.5
Feature	Track	Riparian	
Slope (%)	4	27	
Soil Texture	SL	SL-SCL	
Bare ground	100%	100%	
Weeds	Absent	Absent	
Debris	Absent	Absent	
Natural trees	0	1	1
Planted trees	5	112	117

### Cross-section



### Photo



**PHOTO:** UB9S1E

Photo taken from the end of Transect 1, looking (upslope) to the top of the repaired slump.

Date: 13/11/2014

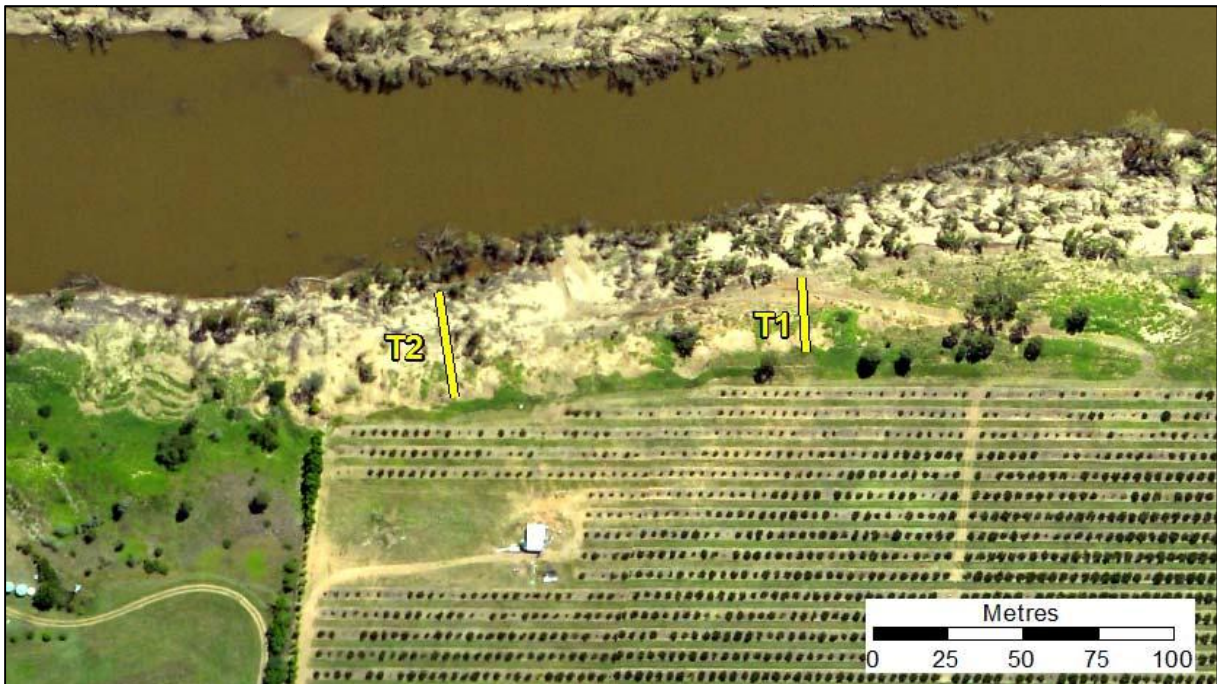


## Site 10 - Report Card

### Site Data

Locality	Gayndah	Soil type (ASC)	Orthic Tenosol; Rudosol
River	Upper Burnett River	Soil Profile Class	Burnett
Dist. from river mouth	188m	Geology	Qa
Dist. from structure	11km US; 62km DS	Regional Ecosystem	12.3.7b/12.3.7
Section of river	Inside bend	Erosion	Scouring & slumping
Bank height (ave)	96m	Works	Earthworks & reveg
Bank length (ave)	32m	Flood height (2013)	99.5m (LiDAR, AHD)
Bank slope Class	Steep	Mean annual rainfall	611mm
Aspect	North	No. of Transects	2

### Post-Flood Image



### Site Photo



**PHOTO:** UB10S1x

Photo taken at Segment 2 of Transect 1 (from on top of vehicle) looking west (upstream) towards Transect 2.

Note immediate change in slope to right of track and bend in river towards the left, in the distance.

## Land Use

Land Use	Site	Adjacent	Catchment
Historical	Cattle grazing	Cattle grazing	Cattle grazing & citrus
Pre-flood	Riparian zone	Citrus orchard (planted Sept 2008)	Cattle grazing & citrus
Current	Riparian zone	Citrus orchard	Cattle grazing & citrus
Future	Riparian zone	Citrus orchard	Cattle grazing & citrus

## Pre-flood Management

The monitoring site is located within the riparian zone, immediately adjacent to a citrus orchard. Row direction is north/south parallel to slope. The riparian zone had been subject to historical clearing/grazing/disturbance, with an access track installed running from the top of the bank down to the river and irrigation pump (track crosses T1). The riparian zone is unfenced. Land use in the wider area includes cattle grazing and citrus farming.

## Flood Damage

Floodwaters covered approximately 10% of the farm, with the water level extending into the second row of citrus trees back from the river. Significant sand deposition occurred along the riverbank upstream (east) of the site; and significant riverbank scouring occurred at the site, extending both upstream and downstream (west).

## Remedial Works

Post-flood earthworks were undertaken by the landholder (date unknown) prior to project commencement. Project works included weed treatment, further battering to reduce slope steepness (completed September 2014) and revegetation (completed October 2014). Secondary planting was required in January 2015 to replace 60% of plants, which had died due to hot, dry weather in December (and low water holding capacity of the sandy soil). Planned maintenance regime is unknown.

## Maintenance

Monitoring (minimum 3-monthly) of site condition will be undertaken by the Project Manager until BCCA project finalisation in June 2015. Following project acquittal, maintenance (including irrigation and control of weeds, stock and fire) will be the responsibility of the landholder. Whether further replating (i.e. due to potential establishment failure of seedlings) will be undertaken prior to BCCA project completion is unknown, as is irrigation regime.

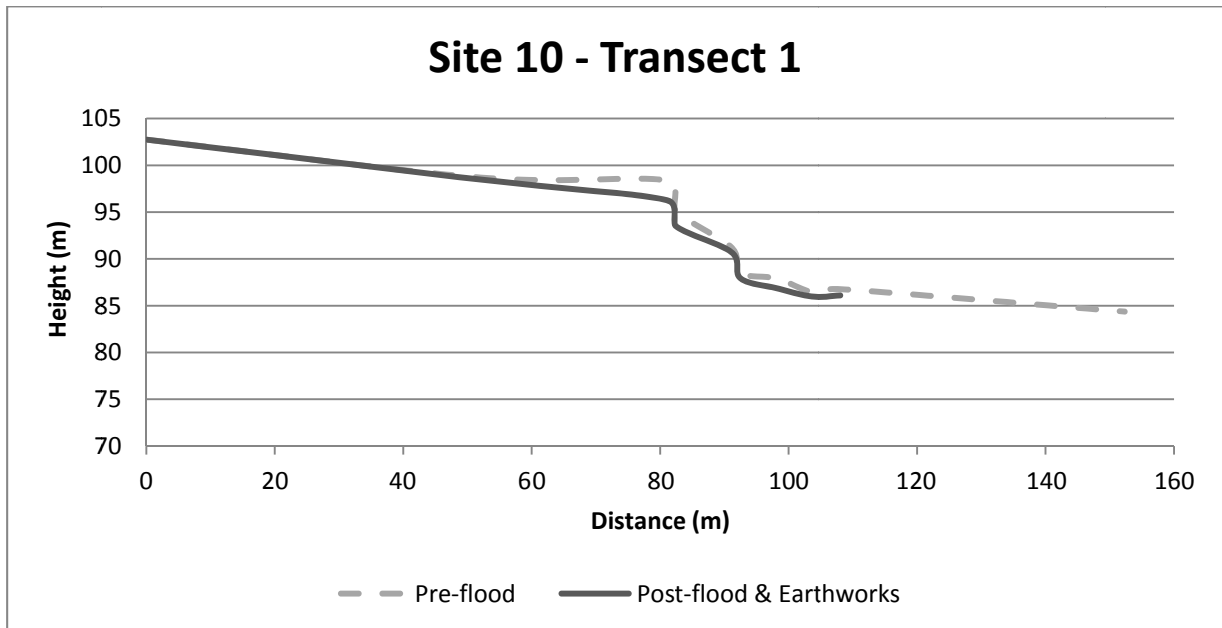


## Transect 1

### Transect Data

Segment	1	2	3	4	TOTAL
Length (m)	52	21	28	Not avail	(~111m)
Slope (%)	8	55	24	Not avail	
Feature	Orchard	Riparian	Riparian	Riparian	
Soil Texture	LS	S	S	S	
Bare ground	60%Row/5%Int	60-40	20-80	5	
Weeds	Absent	Present	Present	Present	
Debris	Absent	Present	Present	Absent	
Natural trees	0	5	4	12	21
Planted trees	0	4	0	0	4

### Cross-section



### Photo



**PHOTO:** UB10S2A

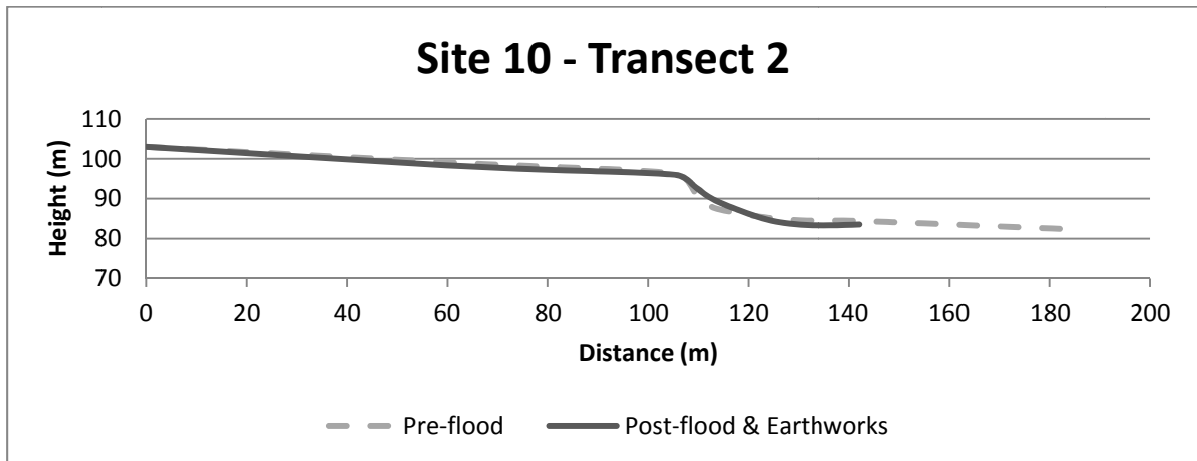
Photo taken at Segment 2 of Transect 1 (from on top of vehicle), looking along transect (downslope) towards the river.

## Transect 2

### Transect Data

Segment	1	2	3	4	Riparian island	TOTAL
Length (m)	64.1	34.4	12.2	Not avail	Not avail	(~101m)
Slope (%)	8	42	45	Not avail	Not avail	
Feature	Orchard	Riparian	Riparian	Riparian	Riparian island	
Soil Texture	LS	S		S	Not avail	
Bare ground	30%row/20%int	5%	15%	30	?	
Weeds	Absent	Present	Present	Present	Present	
Debris	Absent	Absent	Present	Present	Present	
Natural trees	0	0	18	13	Not avail	
Planted trees	0	14	6	0	Not avail	

### Cross-section



### Photo



**PHOTO:** UB10S2A

Photo taken at Segment 2 of Transect 2 (from on top of vehicle), looking along transect (downslope) towards the river.